



FRIDAY, NOVEMBER 30, 1894.

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Contributions.

A War Time Bridge.

BROOKLYN, Nov. 12, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of Nov. 9, page 773, appear two illustrations and a description of Mr. J. W. Murphy's bridge across the Gauley River, West Virginia, built by him in 1861. These illustrations are from photographs, which it is stated, are probably the only ones in existence. I trust this is a mistake; copies of these photographs, given to the writer by Mr. Murphy, were deposited by me about 20 years ago in the Library of the American Society of Civil Engineers, and should still be there.

It may be proper to add, that there is in this library a mass of material, relating to early engineering in this country, in the shape of reports and illustrations, which cannot be found elsewhere or reproduced, and which, from the lack of a handy catalogue, is largely unknown and nearly inaccessible to engineers. G. LEVERICH.

Rating Freight Train Loads by Weight.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Oct. 26 "Z. Y. X." quotes the president of a large railroad as saying that "The successful manager was the one who turned his attention largely to the systematic conduct of the operations of the road, especially in the matter of close research and scrutiny of details involving expenses." No doubt, if "Z. Y. X." has conducted the operations of his road upon that plan, it accounts for the saving during the past year of an amount sufficient to pay a small dividend. Your readers will all regret that "Z. Y. X." did not give us some concrete facts, for as you say, they do "make 'mighty interesting reading.'"

I would like to ask "Z. Y. X." if his road, or any other road that he knows, has adopted the method of rating train loads upon the tonnage basis instead of the car basis? Also whether he knows of any detail of operation that will better repay careful attention? It is a matter of common knowledge that the unit of the car load is a variable unit. A car load, as was recently shown in a paper read before the New York Railroad Club, may consist of a single tub of butter weighing less than 50 lbs., or it may consist of 70,000 lbs. of grain. A locomotive rated at 45 loaded cars may have the required number of loads, and yet have not much more than half the amount of tonnage it is capable of drawing.

A certain railroad that has recently been investigating this matter, found that its train loads, drawn by one class of engines that were given an equal rating of 45 loaded cars, varied from 650 tons to 2,000 tons (weight of freight and dead weight of cars included) over the same division of road on the same day. The wide variation was not due to the allowance made for varying speeds with different classes of freight, but was almost entirely the result of the "blind-fold" method of rating train loads. This discovery has set some of the officials to thinking. They are now trying to ascertain not "where they are at," but where they will end up if this wasteful method of operation is not soon stopped.

The tractive power of a locomotive is pretty well known before it is built or put into service. If, however, there is any doubt upon this point, its power may be definitely ascertained by giving it a test in actual service. Railroad managers in buying or building locomotives are quite particular to make the designs and specifications such that each engine will pull a certain number of tons. But it appears that after the locomotives are placed in actual service, little, if any intelligent effort is made to see that they are required to perform the maximum service for which they were so carefully designed. They

are intended and expected to draw trains of a certain weight. As a matter of fact no one knows how much or how little weight they are drawing daily. Train loads have always been, and on a majority of roads are still, rated upon the basis of so many loaded cars without reference to tonnage. This is only another familiar illustration of a pernicious custom which has been too long continued through force of habit. We have been running in a rut and it is time we got out of it.

It has been said that because yard men and train men are not expert mathematicians, and because they work in all kinds of weather, it would be impracticable to add to their embarrassments by requiring them to sum up long columns of figures for the purpose of getting the tonnage of trains. But to ascertain approximately the weight of a train is not a difficult matter if a systematic method of getting the information is adopted. Each car bears upon its sides its light weight. Once every day, or oftener, the numbers and initials of every car in the yards are taken, showing what tracks they stand upon. Every car that arrives and leaves the yard is taken into the yard office records. Why not at the same time take the light weights? If any train arriving or leaving is made up wholly of empty cars, its total weight is the sum of the light weights of the cars. If a portion or all of the cars in the train are loaded it becomes a question of how to ascertain the weight of freight in each loaded car. Every one knows that a way bill must accompany every loaded car. It may be either the regular way bill or a running slip. The agent who bills a loaded car knows the weight of the freight it contains. It would make no appreciable increase of clerical labor for him to show upon the outside or margin of every way bill or running slip the weight of freight represented by it. Furthermore, the forwarding agent, without trouble, could show on way bill or running slip the light weight of the car, which information his clerks could procure when they take the number and initial for their records. Now, if each running slip for a loaded car shows on its face the weight of freight and the dead weight of the car, it is evident that yard men and train men will find their labor light in computing the tonnage of trains. They will, of course, have to procure for themselves the weights of empty cars.

The yard master's records, the conductor's records, and the reports to the car accountant's office, should have a column to enter opposite each car its total weight. In this way not only the total tonnage of each train would be known, but it would be possible to discover individual cases of lightly loaded cars which perhaps it might be desirable to transfer and consolidate with other cars going to the same destination. At the present time I believe nearly all roads figure the cost of operating locomotives upon the basis of the number of miles run. Would it not be much more satisfactory to compute the cost upon the basis of the mileage and the number of tons hauled? This would be possible under the system I have suggested.

A. B. C.

The Fast Run from Jacksonville to Washington.

SAVANNAH, Ga., Nov. 19, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the October number of *Scribner's Magazine* there is an interesting article by Mr. H. G. Prout on "Railroad Travel in England and America." It is very enjoyable and contains much valuable information, but my native pride compels me to take exception to his comparison between American and English speeds wherein he mentions the Empire State Express and the defunct Exposition Flyer, which ran 964 miles at the rate of 48.2 miles an hour, but omits the fast run of Aug. 26, 1894, from Jacksonville to Washington. This was over the Savannah, Florida & Western, the Charleston & Savannah, the Atlantic Coast Line, the Richmond, Fredericksburg & Potomac and the Pennsylvania. This run should be pretty well known by this time and I think it is the world's record. The distance was 780.8 miles and the speed, including 24 stops, was 49.36 miles an hour. Excluding stops the rate was 53.29. On the Savannah, Florida & Western one mile was run in 48 seconds and the distance from Charleston to Florence, on the Atlantic Coast Line, 95.7 miles, was run in 99 minutes, including a stoppage of three minutes for water. As we are somewhat proud of this record we are sorry to see that it does not find a place in Mr. Prout's enumeration of fast runs. S. F. & W.

[Mr. Prout did not overlook the excellent performance referred to in the foregoing letter, and it was reported in the *Railroad Gazette* of September 21, page 650. The article for *Scribner's Magazine* was put in type in June, two or three months before the Florida fast run was made. The large magazines go to press at least a month before the date which appears on their covers. As we stated in our note of September 21, we are not sure but the Exposition Flyer, on occasions, made as good time for 780 miles as did this special train from Florida. The engines showed their ability to do it many times. But this does not detract in the least from the credit due to the Southern roads, for the New York Central, with its four tracks, and the Lake Shore with its magnificent facilities, have advantages not enjoyed by roads doing a smaller passenger business.—EDITOR RAILROAD GAZETTE.]

History of Freight and Passenger Terminals at St. Louis.

The Development of the Railroad Facilities at St. Louis, since 1874, was the subject of a paper giving interesting reminiscences which was read before the Commercial Club of St. Louis, on Oct. 20, by Dr. William Taussig, President of the Terminal Railroad Association of St. Louis, and a member of the club. Dr. Taussig has been President of this Association from its beginning, and has been intimately connected with its predecessors since 1867, eight years before the bridge was opened and before St. Louis had any railroad facilities other than those common to all country towns. He is therefore especially well qualified to recount the history of the enterprise.

The Eads bridge was opened in 1874, previous to which the transfer of freight across the river was in the hands of the St. Louis Transfer Co. and the Wiggins Ferry Co. The latter transferred cars by boat and the former delivered freight at store doors. Merchandise by wagon was 6 cents per 100 lbs. from shore to shore and 9 cents if delivered at the store door. Carloads, then averaging 10 tons, were charged from \$6 to \$10. The Transfer Co. now delivers at store doors for 3 cents to 4 cents and cars are transferred across the river at an average of \$4.46.

The bridge was begun in 1867 and completed in July, 1874, but by reason of difficulties as to carrying out contracts with the various railroads, it stood idle for a year after it was finished. The merchants entered with great enthusiasm into the celebration when the bridge was opened on July 4, 1874, but then sat down and failed to use it. As soon as business was attempted, the Wiggins Ferry Co. reduced rates and there was ruinous competition. Passenger tickets were forced upon the public, so that they became currency in the retail stores. Each boat had a barrel of whiskey and teamsters had free drinks. The bridge company then supplied ice water on the bridge and Dr. Taussig says that the teamsters appreciated it more than they did the ferry whiskey. The ice water supply has been continued to this day. In the summer of 1874, in the absence of traffic to make the bridge pay, it was converted into a park for the people on hot summer evenings, and a band and refreshment tables were provided. This was a great success financially, and ever since then the bridge has been thrown open free to the poor of the city on hot summer nights.

From the west end of the bridge the present railroad runs westward under Washington street and then southward under Eighth street, in a tunnel about a mile long. Before this tunnel was made there was a great scheme for a magnificent Union passenger station in the center of the city, the tunnel to run through its basement. A short distance further on the tunnel ran close to the basement of the new post-office building, and Mr. Mullett, Supervising Architect of the Government, had a side track made and it was the intention to have all mail cars stop there. This plan failed, of course, as did the Union station, but Dr. Taussig says that \$150,000 additional was spent on the tunnel to connect it with the post-office. The track was used, however, to deliver granite for the construction of the building. In order to keep the smoke out of the post-office building the opening had to be walled up finally.

Financial difficulties and disagreements with various railroads delayed the establishment of terminals in St. Louis until after the panic of 1873. When land was finally bought the company began with a small freight house at the southern end of the tunnel and put down a side track to hold 20 cars, and a beginning was made by bringing across coal for local delivery. Hundreds of acres in the region of the Union depot were then nothing but mudholes and dumping places for rubbish. The speaker then sketched the progress of improvements up to the present time, when the Terminal Co. has 103 acres of ground, with 33 miles of track, capable of storing 5,000 cars. The present freight house is 130 ft. x 650 ft., of brick, and 250 cars a day can be handled. The amount crossing the bridge daily is 2,500 tons besides bulk freight, which amounts to 7,500 tons more.

The yards of the Terminal Association now in use are at 14th, 16th, 18th and 21st streets, and new ones are to be made at Ewing avenue, Montrose avenue and Compton avenue. Coal, lumber, grain, iron, ice and fruit have each a yard by themselves. Trains brought to the city from East St. Louis are switched in station order before crossing the bridge. Near the south end of the tunnel is the "Cupples station," which was described in the *Railroad Gazette* of July 10, 1891. This is a 7-story building occupied by a dozen or more wholesale stores, fronting on a business street, with tracks entering from the rear as in an ordinary freight house; and by the aid of elevators the freight to and from the firms occupying the building is handled here by itself, the building being, in fact, a separate station. Freight is distributed in the building on four-wheeled trucks which carry two tons each. These are taken to any floor by the elevators. Over 100 cars a day are handled here, nearly all package freight.

The company has had to constantly enlarge its property at East St. Louis to keep pace with the business on the west side of the river. The yards there cover 70 acres with 20 miles of track. Connections are made with each of the 16 railroads terminating there, and Dr. Taussig says that the business of dealing with these competing roads, without preference or undue discrimination, requires a tremendous amount of patience. No men are more jealous of their rights than railroad men and his office is the best possible school of forbearance.

The speaker then sketches the meagre facilities of the roads in St. Louis previous to 1874, and describes their present large establishments. The Missouri Pacific used to be controlled by the city and county and there was an annual political scramble for election to the Board of Directors. The Iron Mountain was sold by Thomas Allen to the State of Missouri and these roads had merely a few tracks and a shanty apiece. The Missouri Pacific was sold by the State to the Atlantic & Pacific, which let it go under foreclosure and it was bought by Commodore Garrison. In 1879 Jay Gould bought both roads and now the Missouri Pacific has in the city 125 miles of track and 500 acres of ground, with a large brick freight house; the Iron Mountain has 75 miles of track and 100 acres of ground. The St. Louis & San Francisco has a large freight house and yards, but it still comes in over the Missouri Pacific tracks. It has bought large tracts of land for extensions.

On the north side of the city the North Missouri, now the Wabash, had a small terminal at North Market street. This also was controlled by the city and county and was a political football. To-day the road has a large yard at North Market street and a larger one at Luther; there are 155 acres of ground and 57 miles of track in all. The Chicago, Burlington & Quincy, which has established its line to the city within the last year or two, has 518 acres of ground and 33 miles of track. The use of the Burlington terminals is shared with the Missouri, Kansas & Texas.

The Wiggins Ferry Co. is still a large factor in St. Louis freight business. It owns 23 miles of track and occupies 38 acres of ground. This land is not owned but is leased from the city, making the interest charges *nil* and giving the ferry company a great advantage.

The Merchants' bridge, recently completed and now operated in connection with the Terminal Co., was the main factor in developing the terminals in the northern part of the city. It controls 66 acres of land and has 23 miles of track. It will soon connect with the new Union passenger station by a line in course of construction, from 12th street to Gratiot street, and then there will be a complete circle about the city. On this belt line, in northern St. Louis, the Pennsylvania Railroad and the Louisville & Nashville have each erected large freight houses. The Terminal Association proposes to build from the Merchants' bridge westward to the Wabash and the Missouri Pacific. This will open valuable locations for industrial establishments and the line will be available for through traffic when the old line is crowded.

Summarizing the foregoing statistics, the speaker estimates that the freight terminals on the west side of the river aggregate 1,500 acres of ground and 400 miles of track. With these facilities the freight handled in 1893 was 16,000,000 tons.

In the matter of passenger terminals, the Missouri Pacific began with a small frame station at Seventh street and the Iron Mountain, with a still smaller one at the foot of Poplar street. There were no street cars and passengers had to take an exciting ride of an hour or two in an omnibus to reach the cars. Passengers for the East started from the sidewalk in front of the Planter's House on a stage whose driver endangered their lives every time he drove on to the ferry boat. In 1872 and the following years various plans were proposed for a Union station. By this time the Missouri Pacific had built a branch to the river below the city and declared itself independent of the bridge, and Henry Flad, Walter Katte and other engineers were engaged to look up a location north of the bridge. All schemes failed, however, and in April, 1874, a separate company, the Union Depot Co., was organized and the station was opened June 13, 1875. The present magnificent station, described in the *Railroad Gazette* of July 24, 1891, and Aug. 24, 1894, was opened for use only three months ago. The plans for it were begun in 1889 when the other companies were consolidated into the Terminal Railroad Association.

In reciting the history of the bridge, Dr. Taussig refers to a fire in 1877 which damaged the east approach so that passenger trains were suspended for seven days and the wagon road was out of use more than a month. In the same year the strike, which started in Pittsburg, caused great havoc in St. Louis and the mob had full possession of the bridge for a week, running engines and cars where they pleased. The loss of traffic was very serious. In the great southwestern strike of 1886 freight business was suspended for nearly two months. The strikers drove the men out of the interlocking tower at East St. Louis and Superintendent Morris Wuerpel handled the levers alone for 30 days and nights, exposed to the threats of the rioters.

In referring to the old St. Louis Transfer Co., which began as the Valentine Freight & Express Co., in 1857, Dr. Taussig says:

In its early days, and at the period of which I speak, that company was mainly owned and controlled by railroad officers. This is an interesting fact in so far as it shows how different the ethics of official propriety were then from what they are now. At present, any prominent railroad officer would consider it beneath his dignity, and as casting a moral shadow on his integrity, to become personally interested in any enterprise or undertaking that might influence, or be considered to influence, his official action. There is a great advance in moral cleanliness in that regard among railroad officers of the present day. At that time, however, no such scruples obtained; neither public sentiment nor the accepted views of official limitations condemned such action, and it was considered as perfectly proper on the part of railroad officials to become interested in sleeping car companies, air-brake and other patent appliances, telegraph and express companies, stock yards, and fast freight lines. In fact, most of the fast freight lines of that day were owned and controlled, not by the roads as corporations, but by the officers of the roads, who did not

hesitate to benefit their private interests by their official actions. When, therefore, prior to the building of the bridge, the question of St. Louis delivery came to be considered by the roads on the east side of the river, coupled with the necessity of having a well-organized and responsible agency to do that service, the St. Louis Transfer Co. (of which the presidents, superintendents, freight agents, and other officers of the roads were the principal stockholders) was designated by those roads as their agency to do that business; and the arbitrary rate of 9 cents per 100 lbs., and 50 cents per passenger, and for each piece of luggage, was fixed and allowed.

You can easily imagine how disastrously this arrangement affected the Eads Bridge when it opened for traffic. The functions of the bridge, in which the railroads and their officers had no money interest, was to transfer freight by steam in cars; the function of the St. Louis Transfer Co., in which the railroad officers had a direct interest, was to transfer the freight with its teams; hence as between team and steam, the team prevailed. So far as the contracts which I have mentioned were concerned, the railroads had no scruples in absolutely ignoring them. They claimed at once that their lines, by charter, terminated in East St. Louis; that they had no right to cross, with their engines and cars, over into the State of Missouri; that all their properties were in East St. Louis, and that if the bridge wanted their business, it must come and get it. The bridge therefore, which, without the patronage of the roads could not get any business, stood practically idle for more than a year after its opening.

A Bridge Built of Old Rails.

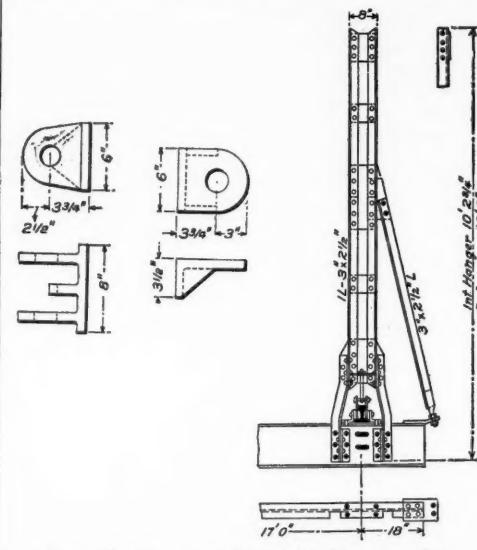
We have received from Mr. J. E. Greiner, Engineer of Bridges of the Baltimore & Ohio Railroad, blue prints and photographs showing a design of bridge recently built by him out of scrap material. Two of these bridges have been built, designated in the records of the railroad as 51B and 38B, and the photographs from which engravings are made are from one of these bridges. The line engravings are from a general drawing. The description of the design which follows is principally in Mr. Greiner's words.

The top chords and inclined braces are made of rails in pairs, and the bottom chords of a single rail. The double rails are bolted together at panel points and at their centers, cast iron separators being used to regulate their distance apart. The hangers are made of two light angles tied together by gusset plates and spread at the bottom so as to clear the flanges of the bottom chord rail. The floor beams project two feet beyond the center of the bottom chords so as to give a firm support for the knee braces which join the hangers at about their middle, and are adjustable.

Among the novel features of this truss may be mentioned the hinged bearings at the ends of the inclined braces. These are made of cast iron and held between the side plates of the upper chord by a pin passing through the side plates. The braces simply abut against these bearings which will accommodate themselves to any inclination which the braces may have. The side plates are made so as to lap over the ends of the rails and

plates are inserted between the bottom chord rail and the tops of the floor beams, and the rails and floor beams securely bolted together. The adjustable bolt having then accomplished the purpose for which it was intended, may be removed if desired. The spring of the bottom chord rail being against the tops of the floor beams and these being bolted to the hangers, will hold the initial strains in the bridge. By this adjustable device, camber and inaccuracy of length of braces due to careless workmanship, can be regulated to a nicety.

All members being stiff, the structures are remarkably free from the vibrations and tremors which are invari-



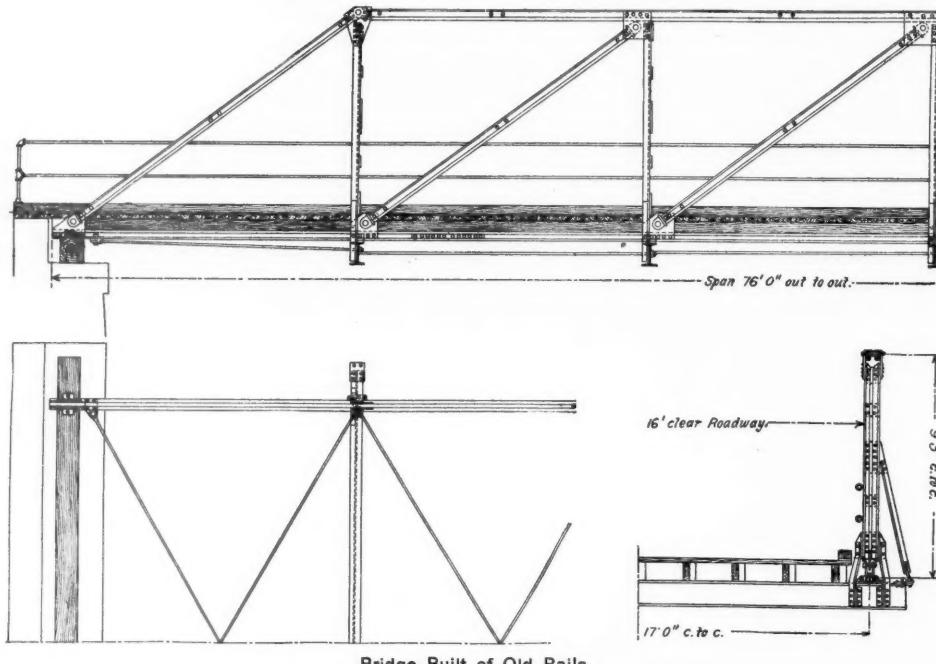
Brace Bearings and Adjustable Hangers—Old Rail Bridge.

ably present in highway bridges having light rods for tension members.

The knee braces attached to the long ends of the floor beams and the hangers, are of help in lining up the top chord and holding it in line when under strain.

These bridges were built of scrap material, such as accumulates in the stock of any railroad. The rails were scrap rails valued at \$9.50 per ton. The angles from which the hangers were made were of short lengths and were spliced at their centers. All gusset plates were cut out of old web plates about 60 in. wide by 10 ft. long, which had been punched for other purposes. This necessarily involved considerably more shop work than would be required had the gussets and angles been ordered from the mills in correct lengths.

The two bridges were built in the repair shops of the



Bridge Built of Old Rails.

the braces and a single bolt passes through the side plates and the rails so as to prevent them moving out of position. The connections of the braces and bottom chords are precisely similar to the upper chord connections except that the hinged bearings are placed on the outside of the side plates instead of between the side plates.

Another novel feature of the design is the employment of a stiff hanger capable of adjustment. The floor beams are bolted or riveted to the hangers below the bottom chord rail and there is a small bolt taking hold of the side plates of the bottom chord rail and passing through a shelf attached to the hangers. This is shown in the end elevation. By screwing down the nuts of these bolts, the bottom chord rail is raised above its contact with the upper flange of the floor beam, and an initial strain is given to the hangers which forces all the braces to a solid bearing against their abutting surfaces. After this adjustment is made in the field, shimming

railroad company and required but the simplest tools in their manufacture.

The cost of bridge 38B is as follows:

Material taken at market rates.....	\$3.35 per ft.
Labor in shops.....	2.50 "
Floor.....	.84 "
Erection.....	2.49 "
Total.....	\$9.18 per ft.

Considering the fact that this was the first bridge of the kind ever built, and that considerable labor was required in fitting and splicing the short angles and in cutting small gussets out of large web plates, this price is very reasonable. Bridge 51B, exactly like 38B, cost about the same in the shop, but was erected for 80 cents per foot less, making the total cost \$8.38 per running foot.

The above costs include the removal of the old structures, which were timber, pony, Howe trusses, and giving the bridges a coat of paint in the field; and they are

about 20 per cent. less than those at which the company can build substantial wooden bridges for the same openings and in the same locality. The writer has received bids for these same bridges from firms regularly engaged in bridge building, at \$1.50 per running foot less than the

apolis on one side and the New York and Olympia on the other. Comparing with the New York the gain of the Minneapolis is 11.9 per cent.; comparing with the Olympia it is 21 per cent.

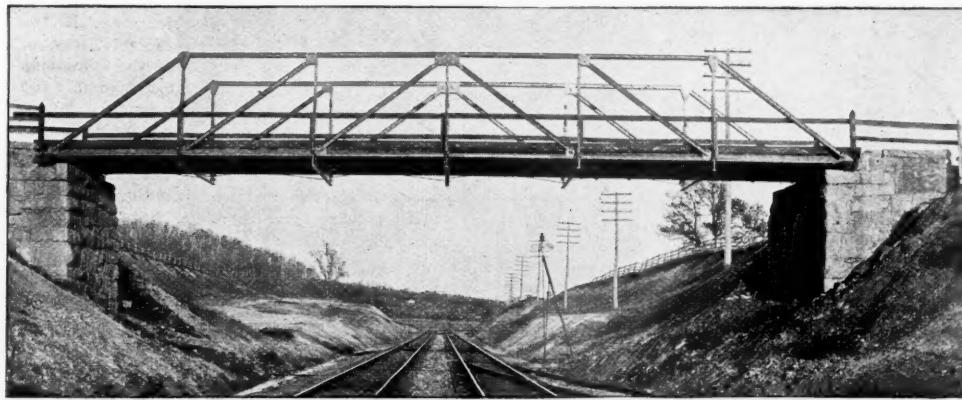
In searching for the cause of the greater economy of the



Bridge Built of Old Rails—Baltimore & Ohio Railroad.

above prices. This will bring the total cost of the structure, erected complete and painted, below the cost of the lightest highway bridges in the market. The particular advantage of this kind of structure for railroads is that old rails, which are always on hand, can be utilized, and the cash outlay required for labor and additional material

triple-screw, the first suggestion is that the center screw is favorably placed for securing whatever benefit there may be from working in the forward current of the frictional wake; but most authorities have stated that while the screw would be helped, any such gain would be offset by the increased resistance of the vessel due to the screw in-



Bridge Built of Old Rails—Baltimore & Ohio Railroad.

is so small that it brings the cost well within the price of the cheapest wooden structures that can be safely built.

Letters patent have been granted for the novel features in this construction.

The Society of Naval Architects and Marine Engineers.

We conclude from page 801 our report of the meeting of the Society of Naval Architects and Marine Engineers held in New York week before last.

THE TRIPLE-SCREW CRUISERS, COLUMBIA AND MINNEAPOLIS.

Engineer-in-Chief, George W. Melville, of the United States Navy, read one of the most important papers of the meeting, being notes on the New Triple-Screw Cruisers. When he was called on to design machinery for about 21,000 indicated horse-power for the Columbia, one of the questions that came up was that of economy at moderate speeds when full speed was so high, and another was that of the shafting. No steel shaft had yet been made in this country for the transmission of as much as 10,000 horse-power, and it seemed safer to adopt a design that would give smaller shafting. The alternative to triples crews was twin screws, and this either with one very large engine or two smaller ones on each shaft meant large parts of machinery all through, or great multiplication of parts. It was believed that it was more economical to run one engine of a size of about 2,000 horse-power than to run two 10,500 horse-power engines or even two 5,000 horse-power engines, even if it involved dragging the idle screws, allowed to revolve freely.

It is obvious that if the drag of the two idle screws should require enough more power to make the cost of propelling at a given speed nearly as great as the cost of driving by the after engines of twin screws, there would still be a gain in economy of maintenance and in convenience.

When the ships were designed it was hoped to get about 22 knots for the maximum of 21,000 indicated horse-power. When the Columbia made 22.8 knots with 18,500 indicated horse-power, the news was gratifying and astonishing, but the computations were very carefully scrutinized and verified, and there can be no doubt of the accuracy of the record. Then, later, the Minneapolis made 23.07 knots, making her the fastest large vessel in the world, and, considering the length of the trial, the fastest vessel, large or small.

A very careful theoretical comparison, based on such actual results as are of record is made as to the economy of propulsion, comparing the triple-screw and twin-screw ships. This comparison is made between the Minne-

apolis on one side and the New York and Olympia on the other. Comparing with the New York the gain of the Minneapolis is 11.9 per cent.; comparing with the Olympia it is 21 per cent.

In searching for the cause of the greater economy of the

triple-screw, the first suggestion is that the center screw is favorably placed for securing whatever benefit there may be from working in the forward current of the frictional wake; but most authorities have stated that while the screw would be helped, any such gain would be offset by the increased resistance of the vessel due to the screw in-

DISCUSSION OF COMMODORE MELVILLE'S PAPER.

ADMIRAL MEADE: Being in command of the North Atlantic squadron and the Columbia being in my squadron I propose to try an experiment. I propose to have the Columbia, with her hull in perfect condition, with her coal as good as I can get it, lie in the harbor here waiting for the Teutonic or Majestic to sail out. Then I propose to give orders to the commanding officer to catch that vessel and if he succeeds I shall be the first to congratulate my friend, the Engineer-in-Chief.

MR. JOHN G. TAWRESEY, Assistant Naval Constructor, U. S. N.: It was my fortune to be present on the trial trips of the Columbia and the Minneapolis and I carefully observed the wave profile when they were running at their maximum speed, and before the horse-power was calculated I reached the conclusion that the wave-making resistance at maximum speed was remarkably small—greater in the Minneapolis than in the Columbia, but still very small—and I think that it will be found that the efficiency of the machinery is in a great measure due to the small internal friction of the engines and to the small wave resistance of the vessels. At about 20 knots the Columbia was working under her best conditions. A greater speed is obtained at a frightfully great increase in horse-power, and I think that the wave resistance is the principal cause of that. I fully expect to see in the near future triple screws used for our larger and faster ships, but not because of economy in propulsion, but for the reasons that led to the substitution of twin screws for single screws.

MR. J. F. HOLLOWAY: I once engined a boat with twin screws and twin boilers, which was used for many years as a passenger steamer on the lakes. Later it was determined to take out half of her power and make a single screw steamer of her to carry freight, of course at lower speeds. The change was made, one boiler and one engine were taken out, the other engine shifted to the center of the vessel and one screw used. The result was astonishing, the speed of the boat was decreased very little and the economy in fuel was great. I have long had the theory that screws hung on the quarter, operating in the water running rapidly away are very inefficient. I think the saving from the use of the third screw is that its turning in an incoming flood of water which follows after the ship and offers greater resistance.

PRESENT STATUS OF FACE HARDENED ARMOR.

Captain W. T. Sampson, U. S. N., Chief of the Bureau of Ordnance, read a paper on the "Present Status of Face-Hardened Armor." He said that the apparent difficulties which delayed the development of face-hardened armor have been practically overcome. The makers have been able to control within limits the distortions due to water hardening, and if this distortion exceeds a practical allowance rectification is often possible without retempering. Allowance, however, in shape and dimensions are slightly greater than with homogeneous plates in order to avoid the strains set up by cold bending or the loss of surface carbon in reheating. For this reason it happens frequently that the lengths of armor bolts must be determined after the plate is in position. The shrinkages and changes of angles during cementation and tempering, seem to follow no definite law, but the makers have succeeded in foreseeing that sufficiently well to make most satisfactory butts and joints.

The difficulty of securing structures to the hard face is now in course of solution. Holes could be drilled and tapped at any stage prior to the hardening; but as it was impossible to locate these holes with precision before the armor was fitted into place, this method was abandoned in favor of one by which the carbon was prevented from penetrating over certain areas. This method had its faults also, for gases frequently seeped through the protecting material and harveyized the surface beneath.

A method which will probably be employed in future is to anneal electrically the surface to be drilled. The greatest objection to face-hardening and one which seems least likely to be overcome soon is the expense. The charges for repairs, fuel and labor are very great, the thick plates being exposed to high temperatures for weeks at a time, and repeated machining cannot be dispensed with.

A table is given showing the number, thickness and curvature of harveyized plates now manufactured for the navy. It appears that there are 27 which reach in some parts of the plate a thickness of 18 in. There are 52 17-in. plates and 16 15-in. plates. The number of plates of less thickness than this is over 200.

Our armor makers have had no difficulty in making oil-tempered nickel-steel armor stronger and more resisting than simple steel, retaining the characteristic toughness of nickel. The susceptibility of nickel steel to treatment is remarkable and yet it may be abused in the most shameful way without failure. For this reason the small percentage of losses in manufacture will go far towards wiping out the increased cost of machining. Nickel appears to render the carbon more sensitive to hardening and so water-hardened Harvey plates of nickel steel are toughened at a depth hardly affected in simple steel plates, and the hardening is accomplished with less risk to the plate. Therefore the makers of the Loire have been able to forego oil tempering entirely, using only water hardening.

The only doubt concerning the use of nickel is the feasibility of raising its percentage, which is now 3.25. In Austrian trials a year ago an unhardened plate said to contain 5 per cent. of nickel, defeated five competitors, in-

cluding a Vicker's harveyized simple steel plate and a Krupp gas-hardened plate.

Thus far 28 harveyized plates, all but seven being of nickel steel, have been tested in the United States, and 40, all of which but 14 were of nickel steel, have been tested abroad. Furthermore, nine plates tested were face-hardened in other ways. England has purchased 20,000 tons of harveyized armor, and the great English, French and German firms making armor plate are provided with harveyizing plants.

Certain French authorities place the resistance of harveyized plates at 1.35 compared with simple steel, or 1.8 compared with iron. English authorities arrive at a ratio of 1.93 compared with iron. American experiments with Carnegie plates give 1.93 compared with iron and experiments with Bethlehem plates give 2.14.

The theory has been advanced that with the improvement of projectiles the Harvey plate will lose its peculiar advantage of smashing the projectile and will become less resisting than a homogeneous plate of equal thickness. This argument Captain Sampson considers fallacious. At any rate, harveyizing has increased the resistance of armor 35 per cent, and perhaps 50, according to the thickness of the plate, and has brought about a great improvement in the quality of projectiles.

CARE AND PRESERVATION OF STEEL SHIPS.

Mr. Philip Hichborn, Chief Constructor, U. S. N., read a paper on "Experience Gained with Our New Steel Ships as Regards Care and Preservation." Deterioration in a steel structure is always present from oxidation which can only be prevented by proper protection of the surface. Therefore accessibility of surfaces is a matter of much consideration in designing a vessel, but there are certain places that must necessarily be inaccessible. The care of the framing and plating of the numerous compartments due to the double bottom is very difficult.

Galvanic action arising from the fittings exposed to bilge water must be provided against. Experience has indicated that no damage need be feared to the structural iron or steel of the hull inside as the result of galvanic action except from fittings constantly in contact with bilge water and composed largely of copper; but the outside of a vessel which has any metallic connection with immersed copper, is liable to rapid corrosion, and such metallic connection is strictly forbidden by the navy regulations.

But it is the outside of the ship, below water, which requires more care than anywhere else. It is impossible to keep it thoroughly covered with paint. It has been the practice to dock, clean and paint the steel ships once in six months if possible. Every paint with a good reputation has been tried at one time or another. Most of the well-known patent compositions have given good results in some cases and poor results in others and with the anti-fouling paints the results have been still more discordant.

A table is given of the coal consumption with clean and foul vessels. Thus the Charleston, at about nine knots an hour burned 30 tons a day clean as against 53 foul; the Yorktown 19 as against 29. The San Francisco at a little over nine knots burned 35 as compared with 40; the Baltimore at 11½ knots, 47 and 63. These figures should not be taken as precisely accurate, for in each case the speed was different in the clean and foul vessels which would affect the coal consumption, and Mr. Hichborn's table should be consulted for the precise information. Mr. Hichborn advises sheathing with wood all ships intended for distant service. The European nations have followed this practice to some extent for some time and seem now to be extending it.

In the discussion of Mr. Hichborn's paper Mr. Linnard said that a great difficulty with electroplating the ship's plates with copper on iron is that it is impossible to avoid punctures of various kinds which remove the surface coating and leave a contracted area, on which corrosion induced by galvanic action and ordinary corrosive influences is concentrated and a hole put right through the plate. A further desideratum is an efficient anti-corrosive paint, which has not yet been developed.

Mr. F. L. DUBOSQUE: The Government has found it wise to spend \$50,000 to increase speed a quarter of a knot, but it does not pay attention enough to keeping the bottoms clean, which is so vital a matter in speed. He thinks that it would often be found practicable to reduce the weight of plates by wooden sheathing. The Pennsylvania Railroad Company has had a great deal of experience with sheathed iron vessels. Forty years ago the steamboat Stockton was built, one of the earliest of iron steamers. After running 18 years the plates became so thin that she must have either a new hull or the strength must be increased in some way, to keep the water out. The company sheathed the vessel with yellow pine 2½ in. thick and the boat ran in salt water for 10 years. Six or seven years ago the Government inspectors insisted upon examining the plating. The sheathing was found perfectly tight and the iron was found in about the same condition as when it was put on. The company has six or seven tug boats sheathed with yellow pine, some of them for over seven years, and repairs have been practically nothing. Yellow pine 2½ in. thick and 8 to 10 in. wide is used with galvanic iron fastenings. The sheathing is carefully put on and carefully caulked. A generous thickness of red lead is used between the planks and the iron with a coat of tarred felt.

The idea of electro-plating iron vessels is much discussed, but it is still entirely a matter of speculation.

CELLULOSE FOR WAR SHIPS.

Mr. E. Cheneau read a paper on the Uses of Cellulose in Naval Construction. Admiral de la Barrière, of the French Navy, discovered a special kind of cellulose extracted from the husk of the cocoanut which has a specific gravity only one-quarter that of cork and when compressed to a certain degree is highly elastic, and swells rapidly in contact with water, does not rot or decay and is proof against the attacks of vermin. The proposition is to back the armor with this material, adding immensely to the buoyancy of the ship and automatically filling holes made by projectiles or tams, and thus keeping the ship afloat. By the use of this material the armor may be concentrated around the essential organs of the ship and other parts of the structure left more lightly armored. Holes made by projectiles will not necessarily sink the vessel. Cellulose has been applied on 30 ships of the French navy and many vessels of other foreign powers, and particularly on the Japanese war ships now actually engaged. The reader may remember that Commodore Barbour suggested that herein might be found one of the secrets of the survival of the Japanese cruisers in the engagement with the Chinese battle ships.

In the discussion of this paper Mr. Nixon said that no doubt when we get some reports from the far East we shall find that the vessels kept afloat after being much damaged along the water line were greatly helped by cellulose, and he thinks that if the Victoria had had the fitting with this material that our own later battle ships have, that she would not have sunk. The further discussion of this matter mentioned the fact that it had been the subject of spirited debate for 10 or 15 years and that there is still no unanimity of sentiment as to its net value.

Sundry Engineering Matters Considered in the Construction and Operation of the New York and Brooklyn Bridge.*

(Continued from page 799.)

Cable Transit on the Bridge Railroad.—In the early design of the bridge, necessarily, the best means of transporting passengers across it was considered. Mr. John A. Roebling, its first chief engineer, who died quite soon after its construction was begun, and who designed the structure in general and largely in detail, as it was when opened to traffic in 1883, in his first and only published report to the management, dated Sept. 1, 1867, practically established the method of moving the trains on the bridge railroad, which has been so successfully employed. In this report, describing the running of trains hauled by an endless wire cable, he said such is "an operation perfectly simple and well understood. There is no novel feature and no experiment involved; . . . the different cars being all attached to the same wire rope, their relative positions will be fixed." He proceeded to discuss without decisively recommending a choice of either, two systems of hauling by continuous cable—the "reciprocating," by which the trains are moved back and forth each on its own track; and the "circulating," by which trains are moved in one direc-

to conditions much more severe and restricted than had in similar projects been met and overcome; a greatly larger number of passengers were to be regularly transported, rendering necessary the use of more commodious and consequently heavier cars, to be hauled in trains upon short intervals—and this over steep slopes, terminating at levels on elevated platforms, too short to hold up without disaster, trains over which, from any cause, control was lost. How well these conditions were met, chiefly after the design and under the supervision of the lamented Col. William H. Paine, the assistant engineer who had charge of this department, is shown by the records of operation of the railroad. During the term from when the first public train was run, September 24, 1883, to October 1, 1894—or somewhat more than eleven years—nearly 339,000,000 passengers have been carried, with serious injury to but one and without fatal injury to any thus transported; 770 trains or 3,032 single cars, carrying 258,593 passengers have been hauled in a single twenty-four hour day. For years four-car trains have been run continuously for two and more hours, morning and evening, each week day, on 1½ minutes' headway, and the delay in the movement of trains, resulting from all failures of operation, has been very small; thus, during the year ending November 30 last, the average detention so caused was but one minute for 154,668 passengers.

Since electric propulsion in street railroads has been successfully and so extensively applied, a frequent and pertinent query is: "Why should it not be substituted for cable traction on the Bridge Railroad?" To intelligently answer this, careful examination has from time to time been made by those charged with the bridge management, of the several systems of electric propulsion in continued and promising operation. Notably, one of these, the Intramural, on the grounds of the Columbian Exposition at Chicago last year, exhibited favorably and in conspicuous degree, the development in this department up to that time, in the excellence of its design, in the ease and regularity of its operation, and in its reasonable cost. So far, however, no balance sheets giving the entire expense of electric traction, including first cost, operation, maintenance and renewals, have been had, which would justify, on the ground of cost alone, the suggested substitution of electric for cable power. On the Bridge Railroad, another and imperative condition, far superior to that of cost, must prevail. To transport the large number of passengers to be conveyed, there must be small time and space intervals between the trains, which in transit are moved over steep ascending and descending slopes; with the cable, these intervals are by the train dispatchers fixed, unchangeable by the train conductors, and thereby the dangerous contingency of unwise or careless management of the train men, particularly in emergencies, is largely eliminated. Contrariwise, were the trains propelled by electric motors, each car would be moved independently, and the judgment and faithfulness of the several motormen must necessarily be exercised constantly to avoid collision and disaster. This, involving dependence upon individual action, is the urgent duty of an experienced and prudent

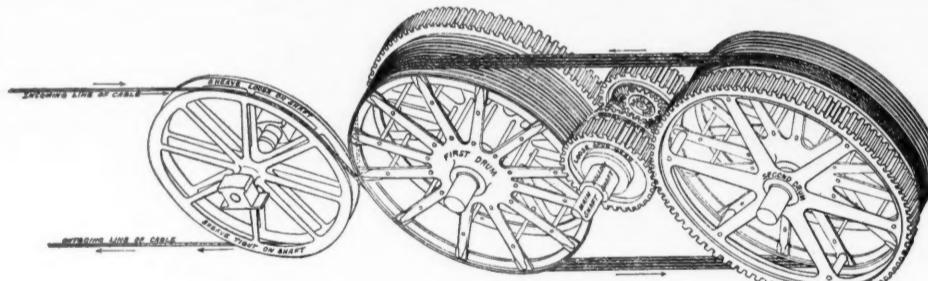


Fig. 6.—Winding Drums and Deflection Sheaves.

tion on one track and in the reverse direction on another track. Referring to the latter he said: "In place of the reciprocating motion of the two trains, the wire rope is kept running around in one direction only, and each car singly, as it fills with passengers, is to be attached to the rope and started. On its arrival at the opposite end, this car is detached, discharged and run over to the other track, and in its time conveys a load back again. Thus the cars will be kept moving singly, in a circular route, always crossing at the ends from one track to the other. At first sight, this system seems to recommend itself as the best of the two, but there will be some practical difficulties to be overcome, which can only be done experimentally on a large scale." It will be noticed that in this outline of operation, for a "single car" which Mr. Roebling referred to, "a train" will be substituted, it describes the method at present employed.

Nearly 15 years passed after the writing of this report, before the practical design for operating the bridge railroad was wrought out and its construction begun. Meanwhile, the only successful circulating system of cable haulage for passenger cars had been worked out in San Francisco—and its adaptability to the peculiar conditions there governing, as well as its economy in operation, had been proven. This was on surface lines, with steep and long slopes, and used for moving comparatively light street railway cars. The bridge railroad was subject

railroad manager to foresee, and so far as possible to avoid.

The Cables.—The hauling cable consists of high-carbon steel wires, in six strands of 19 wires each, twisted in each strand, and the whole laid about a hempen center. Generally these wires were uniformly of $\frac{1}{16}$ inch diameter; one cable, however, had smaller wires in each strand, wound between and outside of larger wires. At $\frac{1}{16}$ inch in diameter, the breaking strength of each wire is not less than 1,000 lbs., whence the ultimate strength of the cable exceeds 114,000 lbs. When new, the cables are 1½ inches in diameter; this is reduced during service, principally from compression of the soft central strand, so that when worn out and removed, the cable is about $1\frac{5}{16}$ in. in diameter.

Six cables have been removed during the operation of the railroad; the first was in service 1,140 days, performed a duty of 22,142,706 ton-miles, and hauled an average of 97 tons. The sixth was in service 509 days, performed a duty of 35,149,894 ton-miles, and hauled an average of 321.1 tons.

Generally, in order of use, the time of service of the cables has decreased, and the average tons hauled similarly increased. What relation these elements of ultimate duty bear to each other is as yet undetermined; a cable would in time fail if run continuously without load; and again, if when new, sufficient load were attached, it would break. Attempt has been made to form an empirical expression for the duty of a cable, which containing the elements of time and

*A lecture delivered October 23, 1894, before the Engineering Section of the Brooklyn Institute of Arts and Sciences, by G. Leverich.

hauling service, would satisfy these conditions; but so far, from lack of data more comprehensive than now at hand, without satisfactory result.

The wear of cables is chiefly internal, the outer surface of the wires being abraded but little; at the splices, where the wires necessarily are overlaid, and in lesser degree elsewhere along its length, the wires tend to imbed, one into the other, until in places, before the cable is removed, some are thus cut off. The continual bending of the cable in the grooves of the winding drums and about the direction sheaves, also causes the wires to break, without considerably deteriorating effect, however, until the cable is well worn; as yet but one cable has entirely parted during service, and this would have been previously removed but for a special reason connected with the substitution of a new for an old driving plant.

To abate wear, the pulleys which sustain the cable between the rails, the sheaves which change its direction, as well as the grips which attach the cars to it, are all packed with leather and sheet India rubber, so that the cable is in contact with iron only in the grooves of the winding drums. Experience has shown that this is decidedly an economic measure, tending to preserve the several grooves with which the cable is brought into contact, and in a more important degree, the cable itself.

The Driving Machinery.—When the Bridge Railroad and its appliances were first put in use, it was equipped with a driving plant designed and well proportioned, not only for the work then to be done, but for an increase in service, which, with wise judgment, was foreseen and considered. Quite early in its operation, however, it became apparent that such increase was more rapid and

power, two engines may together be run for a short while. Recently a fourth driving engine has been installed, of 1,000 horse-power nominal; it, however, has not so far been regularly used.

These engines are placed in parallel lines, and so that the two larger are attached directly to and one at each end of the main shaft; the other two are connected therewith by large gear wheels. The pair of wheels by which the 750-horse-power engine drives, making 70 revolutions per minute, have a pitch diameter of 11 feet, and have 12-inch face; these have been in almost daily use for over twelve months and are nearly noiseless. They, as well as all other gears employed, have involute teeth, and are machine cut carefully to outline.

The winding drums, of which there are two pairs in present service, are placed also in parallel lines, with the main shaft between the two of each pair, a working cable being laid around one set, and an idle or reserve cable around the other.

The Power Expended.—In the operation of this plant, the greatest indicated horse-power observed, was 1,093.2, and the least, 65.6 negative; to which should be added the friction of the unloaded plant, 113.4, showing at that time a total of 179 horse-power, the measure then of the stress induced through the incoming cable to haul the plant. Indicator cards have from time to time, been taken at regular intervals, chiefly of 15 minutes during the twenty-four hours the plant is operated; referring to the last series taken, the means of the indicated horse-power expended with the whole plant loaded, was 284.3, 219.9 and 197.8, and the per cent. of resistance of the plant to the whole work done, was 39.8, 41.2 and 51.9, from the

ranges. The cable is slightly elastic, and yields to these stresses, hence the wraps creep in the grooves

(TO BE CONCLUDED.)

English Signal Practice.*

Form of Signals.

Practically the only form of signal used on main running lines of the principal railways of Great Britain is of the semaphore type. The only other signals used to any extent are what are termed "Ground Disc Signals," or a sort of revolving pot signal, which are used on sidings off of main running lines. This uniformity in the exclusive use of the semaphore type of signals has existed for some years, through joint agreement of the principal roads, and at the instance, as I understand it, of the railways themselves. The railway inspectors of the Board of Trade have decided that the semaphore signal is the only satisfactory standard on new lines, and have recommended it on all existing lines.

The form of the blade is quite similar to that in use in America, being from five to six feet long and nine to ten inches wide, which width is usually maintained back to the point of suspension, instead of being reduced in width, as is usual with us. (As explained in another place, certain subsidiary signals are made shorter, or otherwise dwarfed, to distinguish them from those of main running lines.) English signal engineers do not comprehend the distinctions made in America between interlocked semaphore signals, block signals and train order signals, and the reasons for this are tolerably apparent, to wit: Block signals are interlocked with all switch points nearby, and conversely block stations are located in convenient relation to diverging switches and cross-overs in order that they may serve the double purpose of block signal cabins and interlocking cabins for the switches. It is very rare in Great Britain that it is necessary to put a block signal station at a point where

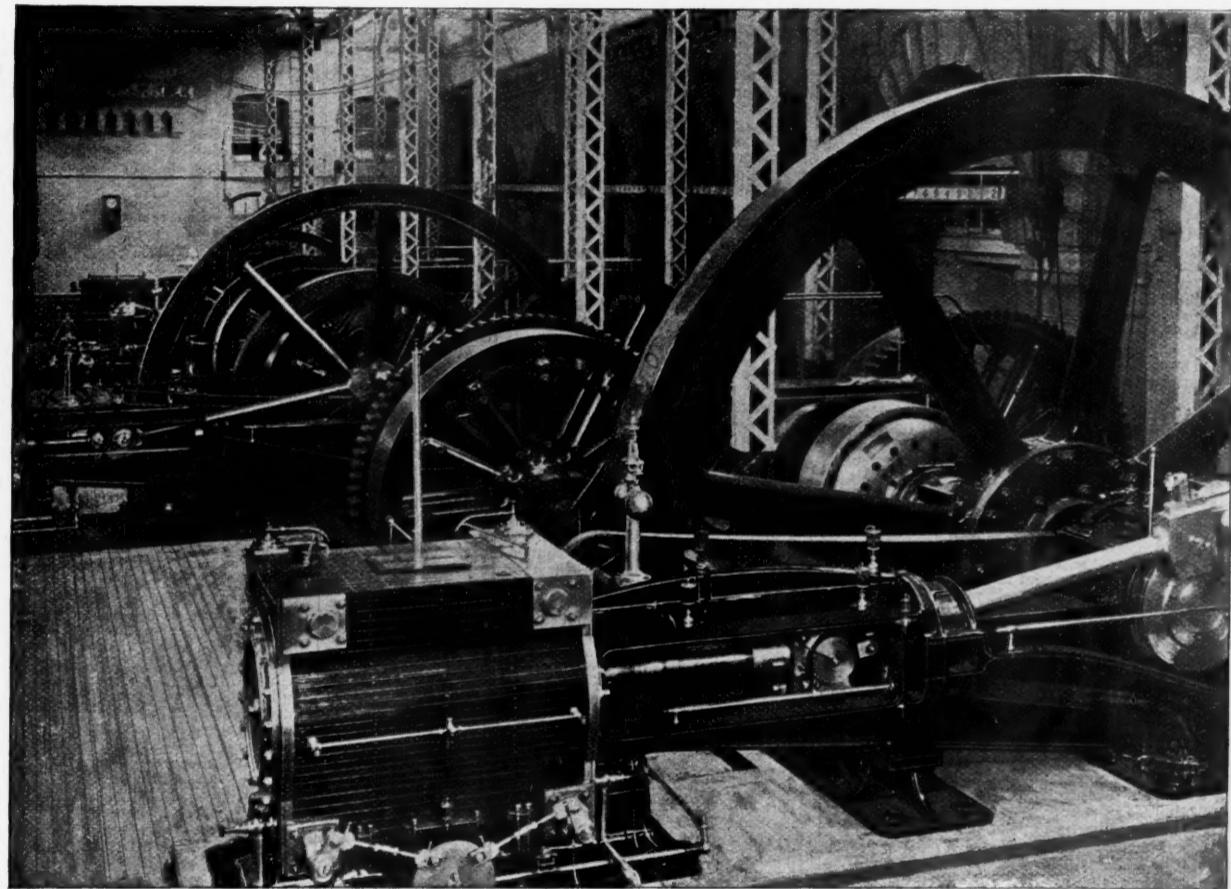


Fig. 5.—Cable Driving Plant,—New York & Brooklyn Bridge Cable Railroad.

soon would be greater than had been provided for or anticipated. Consequently, measures were taken to replace the driving mechanism with a plant of greater capacity and capable of such extension as might in the future be required. It was also then determined to so prepare the design therefor and secure its execution, that in case of failure of any part, another similar part could promptly be put in service; thereby tending to insure against stoppage and delay in the operation of the railroad.

The general features of the design were simple; so far as practicable the mechanism in place and ready for service, is in duplicate; and the whole so arranged and connected that either part can, without much effort, be set in motion promptly. The traffic over the railroad being, throughout the day, quite variable; and to accommodate such, the trains (made up of from two to four cars each) being run at different intervals, the driving power required at different times in the day, for economical working, is necessarily also variable. Again, on certain days, the traffic is comparatively light, and on other and special days, it is very heavy. Hence, at first, in the new cable hauling plant, three driving engines were provided; one of 250, another of 500, and the third of 750 horse-power nominal. These are attached to the main shaft by friction clutches, so that either may at once be used for driving or cut-out, without halting the machinery. Generally, for a considerable interval during the full day, each engine is used; and sometimes, though quite rarely, when there is a sudden and brief demand for increased

larger, middle size and smaller engines operated, respectively.

The Drum Gears.—The cable is wrapped four times continuously around each pair of drums, in grooves provided therefor; and that sufficient friction may always exist between these grooves, and the cable in contact, to haul the aggregate train loads without slipping, a moving weight of about 1,500 lbs is imposed on the outgoing line; also each drum is driven independently from the main shaft. This was found essential during the working of the old driving plant, in which but one drum was driven, and slipping of the cable in the drum grooves, under the heavier loads, sometimes occurred. Of this, there has been but one instance in the operation of the new driving plant, which was under an unusual and extraordinary condition. Another and important effect has resulted from thus driving each drum independently, namely, the working drum's grooves wear with great uniformity; although this wear is comparatively rapid, and continued until about an inch in depth before use of these grooves is abandoned, they remain practically of equal diameter. This wear is caused by the slight extension and retraction of the several wraps of the cable in contact with the grooves, due to the continual change in tension thereon, as they are wound around the drums. When the trains hauled are mostly on the ascending grades, the principal stress is on the incoming line and inward; when contrariwise they are mostly on the descending grades, the principal stress is on the outgoing line and outward; and between these extremes it constantly

there are no switches to be worked, and it is for this reason, probably more than any other, that there is no distinction between a block signal, independent in every way from any switch, and an interlocked signal which is interlocked with a switch. That this condition of affairs will become more common in the United States as the country becomes more thickly settled, the stations more frequent, and double, triple and quadruple lines more numerous, is tolerably apparent, and hence to make any distinction between a block signal, pure and simple, and signal which is interlocked with neighboring switch points, but which may be equally well used as a block signal, would seem very unwise and likely to lead to difficulties in future.

Train order signals are not used in England, because train orders are not used in the same way that they are here. On double lines, which constitute a very large majority of the railways of Great Britain, train orders are only issued on exceptional occasions, and trains are then stopped with the ordinary block signals, and on single lines trains are usually operated on the train staff or train tablet system, and it is necessary for a man to stop at each station and get a staff or a tablet before he can proceed. (A device has been gotten up by which a staff or a tablet may be exchanged at speed, but this is only used on important trains and cannot be said to be the usual or common practice in this method of train working.) In many of the interlocking towers the signals are so arranged as to allow a train to pull up close to the tower so that the operator or signalman can give verbal orders to the engineer and guard, and if the same thing were done in this country it would probably avoid the necessity of having a different form of signal for train order signals. In many cases, however, this would

*A paper by Mr. F. A. Delano, Superintendent of the Chicago Terminal of the Chicago, Burlington & Quincy, read at the meeting of the American Railway Association in New York Oct. 17, 1894; reprinted in full from the *Proceedings*.

necessitate duplicating a number of signals and increasing the expense thereby.

In brief, the form of signals in general use in Great Britain is as follows:

A. All signals on main running lines are of the semaphore type, those for high speed tracks usually five or six feet long and nine to ten inches wide. Those for low speed or freight tracks are usually distinguished from those for high speed or passenger tracks by a large circular ring made of thin sheet iron painted white on the face and black on the back, and placed near the end of the blade so that the centre of the circle comes opposite the centre of the white stripe across the red blade. These semaphores are called "Ring Signals." It is a very convenient way to distinguish the signals for the freight tracks from those for the passenger tracks, but this distinction, it will be particularly noticed can only be appreciated by day-time, and the English railway superintendent would argue in this case, as he does in certain others which I will advert to later, that the engineers and trainmen are taught in this way by daytime to know the location and full meaning of the signals, so that by night they may understand what the signals mean without special distinctive marks. All home or stop signals have square ends and distant signals are distinguished from them by having fish-tail ends.

B. The only other form of signal is a revolving disc signal which is used on hand switches and on the switches thrown from interlocked towers or other than main line switches and rarely on main line cross-overs near important termini. These revolving disc signals are usually used where, in America, we should use a dwarf semaphore signal, and are quite similar to the revolving pot signals which used to be used by signal companies in this country, but which have given way in later years to the dwarf semaphore signal.

Color of Signals.

A. Day Signals.—Home and distant signals are painted red on the face, with a white band or stripe across it near the end. On the back the signal is painted white with a black band. In other words, this is similar to the American practice, except that the distant signal is painted in a manner similar to the home signal.

B. Night Signals.—Most of the important railways have adopted or agreed to adopt green for the "safety" or "all clear" signal, and they all use red for the "stop" or "danger" signal, and it will be noted that the distant signal by night shows precisely the same as the home signal to wit: Red when the signal is at "caution" and green when the signal is pulled to clear, or, as the expression goes in England, when the signal is "pulled off." I made a good many inquiries with a view of ascertaining just why the English roads have adopted green for "safety" instead of white, with a view of getting individual views on the subject and hearing the best arguments, and I found that there was almost no difference of opinion on the subject, and even the roads, for whom the change from white to green meant a pretty heavy expense, seemed to think that there was very little to be said on the subject, so self-evident did it seem to them that white was entirely out of place as a railway signal. Their strongest argument, undoubtedly, is that white lights are so numerous in the vicinity of tracks, whether in people's houses or on bridges and viaducts crossing the tracks, or on streets near the tracks, any of which may chance to come directly in line with some looked for signal, and hence easily be mistaken for the signal itself, and, at any rate, tend to confuse the engineer's mind, that it is essential to select a distinctive color for safety. It may be that because signals are so much more frequent in England and the country along the railways' right of way settled more thickly, the arguments in favor of a distinctive color for "safety" are more important there than in this country. Be that as it may, however, the sentiment in favor of doing away with white for a railway signal is very strong indeed. Had it not been so conservative railway men of Great Britain would certainly not have decided to make the change which they have decided on at an expense, which, on account of the great number of their signals, will be very heavy.

Another argument advanced to justify the advisability of the use of green for "safety" has been that when the glass in a spectacle in front of the signal light is broken a danger signal may be converted by accident or through the malice or mischief of some outside person into a safety signal. This argument has had considerable weight with me until recently, when I have satisfied myself that by the use of a wire mesh skylight glass in the spectacle, a glass which is perfectly safe from ordinary accident or mischief is obtained. For the discovery of this fact I am indebted to my friend Mr. H. M. Sperry, now of the National Switch and Signal Company.

In certain ways the adoption of green for "safety" or "all clear" instead of white has been arrived at rather naturally, as was explained to me by one of the prominent signal engineers. In large, busy stations where it is impossible, on account of the amount of traffic, to run trains except with the greatest caution, it used to be the custom to make the safety position of all semaphores show green at night, that is to say "caution," it being argued that, although everything was clear, still as the density of the traffic necessitated caution it would not be right to show the engine-driver an all-clear light. This practice, however, soon brought about a mongrel system, that is, that the home signal by night, when pulled to clear, would show a green light in the vicinity of busy stations, while out in the country it would show a white light, and railway men came to the conclusion that a signal meaning "caution" was unsafe in practice, and that a signal should mean one of two things, either "stop" or "all right," and they argue very properly, it seems to me, that if it was necessary that trains running through any busy station should use special caution, the caution should be exacted from the men by special rule or notice or in a manner similar to that employed in America, by putting up a sign board directing that the trains shall reduce speed or run with caution.

The fact that home and distant signals are precisely the same at night, although being distinguishable one from the other by day, on account of the square and the fish-tail ends, seems not to disturb railway men in England or strike them as being a pernicious or dangerous practice. As a discussion of this question, however, is in itself quite an interesting one, I will refer to it at greater length later in this report, under the heading of "Distant or Cautionary Signals as used in England."

Position.

Only two positions are used for all semaphore signals, horizontal for "stop" or "danger," and inclined to an angle of 45 to 60 degrees downward to mean "all clear." The three-position semaphore was tried a number of years ago, but was abandoned. The arguments for abandoning it are to be found in what is said on the subject of the use of cautionary or distant signals. One road in England, the Great Northern Railway hangs its sema-

phone signals by the centre. The appearance of the semaphore, when it is horizontal, is just like that of any other semaphore, but when it is in the "all clear" position, on account of the semaphore being hung by the centre, while the blade points obliquely downward the upper end of it is entirely clear from the post. This form of semaphore was adopted a number of years ago on account of an accident which resulted from the accumulation of snow and sleet on the blade which held it at "safety" when it should have been in the "danger" position.

Placing Signals.

A. All roads in Great Britain use the left hand track, and where possible signal posts are set to the left of the track which they govern and the blade points leftward from the post, and hence away from the track which it governs. This, it will be noticed, is exactly the reverse of our method of signalling when applied to a railway using the right hand track. (Some locomotive drivers in England sit on the right hand side of their engine, some on the left hand side.) In all cases this method of placing signals is used where possible. In placing signals, however, the most important consideration is the position of the post relative to the track or line it governs so much as the view of the signal, hence it not infrequently happens, on curves especially, that a signal for the left hand-most track may be on the right hand side of the railway line, and although this need make no confusion on the double or even quadruple lines, I confess that I saw signals at some points where it was difficult to tell which signal governed which line. To be at all safe the engine driver must know absolutely the current of traffic on the lines, and then remember that the blade always points leftward from the post, as seen by the engineer on an approaching engine.

B. The height of signals on the post is also governed entirely by its visibility as seen by an engine driver. This is called "sighting a signal," and it is done with great care with a view of making the signal show well by day or by night. To accomplish this posts are not infrequently forty-five feet high and sometimes higher, and sometimes a large background or screen of boards is built behind the signal so that it will show well by day. Not infrequently, and especially on very high posts, the signals are repeated lower down on the post, so that if a tunnel, bridge or viaduct cuts off the view of the higher signals the lower or repeating signals may be seen.

C. Where there are many tracks, and at terminal and junction stations, it is not uncommon to see signals placed on signal bridges called "gautries" (in which case they are directly over the track which they govern), or on bracketed posts with two, three or even four brackets.

D. When one track leads into several tracks, English railways have heretofore used the system of as many blades as there are routes, using the top blade of the extreme left hand route, and so on. In some cases as many as ten or twelve signals have been put on a single post. This practice, however, has been found to be too complicated and objectionable, and now it is considered better practice to make a separate bracket or post for the more important route or routes. Thus, if the left-hand-most route is not the more important the signals for the less important routes to the left of the more important are put on a separate bracket, so as to leave the more important route to be signalled on a separate bracket by itself or so it will, at least, be the top or prominent semaphore on its own bracket. This system does not seem as simple as our method of only having two home signals to a post, and making the top signal govern the more important or superior route, and the bottom signal all other routes. On a signal post where many signals are used it is quite common to differentiate the signals by making the blades for the more important routes long, and the blades for the less important routes short. This distinction again applies only in the daytime, and unless the terminal is sufficiently well lighted by electric lights, or otherwise, to make the blades visible by night, the engine driver must have an intimate knowledge of the track arrangements, and the signals governing them, to be at all certain that the signal man is giving him the proper route, and I venture to say that in ninety-nine cases out of a hundred the engineer takes whatever signal is given to him and assumes that it is the right one.

The Block System in England.

There has been very little change, perhaps none worth mentioning, in the general methods of operating trains by the block system in the last twenty odd years in England.

The block system is simply a manual system, the signal cabins being placed in such relation to the railway that they may operate switches diverging from the main lines of cross-over connections between them. Block stations are frequently very close together, and at important towns or near junction and terminal stations there are often several within sight of each other. This is partly due to the fact that under the regulations of the Board of Trade, facing point switches can only be operated 540 feet from the signal cabin and trailing point switches 900 feet. The prominent roads, and those with heavy traffic, have every facing point on the line interlocked and almost every trailing point interlocked, and as stations are considerably nearer together than in many parts of America, the block system simply consists of using a series of switch and signal towers as a manual block system, communication being had between the cabins by telegraphic instruments. As far as the safe handling of trains along the main line is concerned the manual system depends simply on watchfulness and obedience to rules on the part of the operators themselves. They are not connected with any central office or train dispatcher, and simply communicate with each other at will. There is one block instrument for each track, and this instrument, which is of the Wheatstone type, has a needle in a dial which, when in the normal position, points to the words "line closed," and when turned to the right or left points to the words "line clear" or else "train on line." The method of operating the block system is about as follows:

When the operator at signal cabin "A" wants to send a train into the block from "A" to "B" The method of operating the block system is about as follows: When the operator at signal cabin "A" to "B" he gives operator at cabin "B" a bell signal with a push button or similar device to call attention and meaning "be ready." The bells are of the single stroke type. This signal is then repeated back and the operator at "A" gives a description of the train by bell signal, which is repeated back, and if the operator at "B" is ready to take the train he puts the handle of his instrument (i.e., the commutator), in the position meaning that he accepts the train. This makes the needle in the dial at block "A" point to the words "line clear," and the operator at "A" may then give signals for the train to proceed, after he has done which he gives a dial signal to "B" showing "train on line," which "B" repeats and gets an acknowledgement from "A." That these signals are very rapidly transmitted back and forth between

the towers, and that the system is operated very efficiently, is evidenced by the fact that even the fastest express trains are very rarely stopped by signals being against them, and the signals, although normally at "danger," have usually been pulled to "line clear" before the engineer sights them. In order to accomplish this in short sections operators are allowed to signal "be ready" and get their signals pulled off in advance of the approach of the train, but not more than seven minutes in advance. Some of these instruments are also made so that in case of admitting several trains into a block, as is done on very busy freight tracks, or in block stations nearing or passing through large cities, the block operators can record on their instruments how many trains they have let in to the block and the block operator at the next block, by recording when each train has cleared, shows on the dial of the first block station how many trains are left in the block. [It is proper to understand that the office of this "dial and needle" instrument is simply a "tell-tale" and to avoid the possibility of operators misunderstanding a simply audible signal or getting confused by a number of successive ones. These instruments require in their operation a certain precision in making the successive signals and tend thereby to make the operator careful and accurate.]

The rules governing the method of giving signals between block stations by bell signals are very complete and elaborate, yet it seemed as if the amount of special knowledge and experience which a man in a signal cabin would require, was far greater than is usually required in the American practice. This department of the service in England always has a superintendent and a number of inspectors looking after it all the time, and in addition to the regular operators in the cabins there are always boys in training for the positions, sending messages, learning to telegraph and doing odds and ends of work about the tower so that they may be competent for promotion.

In this block system which, as I have said, is practically the same system that has existed for more than twenty years, there is no physical reason why a careless or drunken block operator could not allow two trains into a block. Not even collusion of the operator at next signal cabin is required. But it speaks marvels for the very high standard of the employees in this department of English railway service that the number of accidents, considering the number of trains, is very insignificant. It is now being admitted, however, by railway men that something must be devised to prevent the possibility of giving trains clear signals when the block ahead is occupied, and the superintendent of one road acknowledged that a number of cases had happened where operators had accepted trains in blocks when trains or light engine were at that moment stopping directly in front of their cabins. Mr. Sykes, the inventor of the Sykes System (which is too well known in this country to need explanation), has introduced his system to quite an extent on one of the English railways, and various forms of lock and block systems are now being discussed.

Very few railway men in England have any idea of the extent to which we have carried railway signalling in this country, and very few know that there are a good many miles of automatic block signalling in successful operation. English engineers have hesitated a good deal about adopting any form of automatic block system, objecting to any treadle or track instrument system, because it may give a clear signal to a following train, when the rear end of a train which is broken in two remains in the block, and to the track circuit system, because they fear that it will be very expensive to maintain, and prove unreliable. It is just possible that a track circuit would not work successfully in England, on account of the manner in which the rails are held in cast-iron chairs, which in turn are securely fastened to the sleepers, making it perhaps more difficult to insulate the rails from the ground. Of course too, as a wooden centered wheel is used in all passenger service, a wire connection would have to be made between the tire and axle of every wheel, in order to complete the circuit between the rails. Even then, automatic signalling, without the use of men could not come into general use in England, for it would probably rarely occur that it was desirable to put up block signals intermediate between switch and signal cabins. Of course, by the use of the electric track circuit, the signals could be so interlocked that it would be impossible for an operator to throw them to "safety," when there was a train in the block, and in all probability some such system as this will be used in England before many years.

It is not altogether surprising, and it is certainly not derogatory, that the English practice is in certain respects behind ours, they having used interlocked switch and signal systems long before the automatic block signal was ever dreamed of, and having built up a large and immensely complicated system a great expense, it has naturally taken longer for them to see the merits of an automatic or semi-automatic system, or the defects of their own manual system.

Distant or Cautionary Signals as Used in England.

The distant signal is used in England as an indicator or repeater to show to the engine driver the position in which he will find the home signal beyond it, and so that he will have the advance warning that it is necessary, in case the distant signal is in the horizontal position, to stop before he gets to the home signal. In other words, under the English theory, if the home signal could be seen in all kinds of weather a sufficient distance to stop a train, it would never be necessary to employ a distant signal. In no other sense is the fish-tail signal now used in England, so far as I know.

In this country, however, it is used to mean something more; that is to say, it is used in block signal practice to admit trains into block at caution, that is, it is used in order to denote that there are one or more trains in the block. In England, where it is desirable on very busy tracks, especially freight tracks, to admit more than one train into a block, the train is brought to a full stop, and it is then allowed to proceed on verbal order from the operator, who tells the engineer how many trains are in the block ahead.

Where block signals are close together in England, it is not uncommon to find the distant signal of the block station in advance on the same post with the home signal of the station in the rear. In this case, however, the distant signal, on the same post with the home signal, would mean quite a different thing from what it usually means in America; that is, it would be intended to designate the position of the next home signal in advance, and not the condition of the block immediately in advance.

In English signal practice, therefore, the word "cautionary" signal may be dropped entirely. There is no such signal now, and for that reason the fact that they have no distinctive color to denote "caution" for a night signal is not so serious a matter. As has been said before, the home and distant signals by night are pre-

cisely alike, but their meaning is different, an engine driver being permitted to pass the distant signal at speed, provided he is prepared to stop before he reaches the home signal, and the only way in which the engineer can learn to know a distant signal at night, as soon as he sees it, is to know the road so well and the position of the signals so well, that he is not at a loss. One prominent superintendent claimed that it was not a difficult matter; that very naturally the first signal of any group of signals would be the distant signal, as that was always the outlaying signal of any group, and of course this argument is good so far as it goes, but a possible danger would seem to lurk in the case of the distant signal light being out, or burning dimly, and the engineer mistaking the home signal beyond it as the distant signal. (There are two ways in which this contingency is met. First, by providing an automatic bell signal and indicator, which warns the signal man in the cabin, if any of the signal lights out of his view are out, and it is usually in foggy and stormy weather to operate a torpedo placed at each distant signal, to warn the engine driver that he is approaching a home signal.) I did not learn that any accident or trouble of this kind had ever occurred in England, nor could I get any railway man, but one, to acknowledge that it would be desirable; to have a distinctive night distant signal. This gentleman thought that a distinctive night distant signal would be very desirable; at the same time, he argued that as between the advisability of using green for the "safety" signal, or doing away with a distinctive color to denote "caution," because no suitable colors other than red and green had been found, there was no room for argument. This gentleman also informed me that other signal lights had been tried, and all abandoned. So far as he knew, however, the double signal of green and red made with one lamp had not been tried, and he was interested to hear that it was in successful operation in America, and, in fact, was disposed to think it might be an excellent thing. Violet is being used quite extensively on the semaphore signals at junction and terminal stations, or at freight sidings and yards, in place of red. It is not used, however, on the main line, and, as it is unusually used, it is only intended, when cleared, to give rights for a short distance beyond it, to and fro, as in switching, but not a right to proceed out on the main line for any considerable distance. When it is desirable to give a hand signal to a train, to proceed slowly or cautiously, a white or green light, waved slowly from side to side, is used as a night signal. This is coordinate with the universal railway practice that any light waved violently is a signal of danger, or to stop.

The Board of Trade.

The Board of Trade is a department of the English Government which is given, by special acts of Parliament,

Car Repair Yard, Chicago, Milwaukee & St. Paul.

As noted in a recent issue of the *Railroad Gazette*, the repair yards of the Chicago, Milwaukee & St. Paul Railway at Milwaukee are particularly well adapted for the convenient handling and repair of damaged freight cars.

As shown by the accompanying plan of these yards, the tracks for light repairs are run diagonally across the space assigned to them instead of longitudinally, according to the usual practice, thus furnishing a considerable number of short tracks and making cars more easily accessible than if placed in greater numbers on longer tracks. Three of the tracks shown are intended for supply tracks and all lead from a main track alongside the car shed used for heavy repairs. This shed is about 750 ft. long and covers two tracks.

Next to the repair shed used for heavy repairs are the wood-working shops and car shops, while on the other side of the repair yards are situated the foundry, machine and blacksmith shops, tin shop and tank repair shops, and round house.

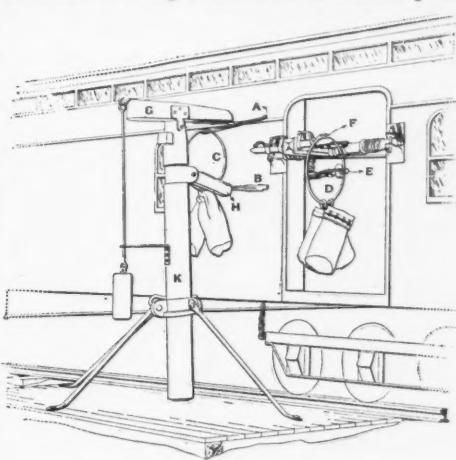
It will be seen that this plan fully utilizes the space provided, and makes it possible to get at any car with the least disturbance to other cars upon which work may be in progress.

Fleming's Mail-bag Catcher.

Mr. H. N. Fleming, of Erie, Pa., has recently patented an apparatus for delivering mail bags to and catching them from moving trains. Its principal features are shown in the accompanying sketch, which was made from an imperfect photograph. The principle of the device is similar to that of the apparatus used on the government railroads of New South Wales for transferring tablets, which was described in the *Railroad Gazette* of April 20 last.

The illustration shows the position of the crane and of the apparatus attached to the cars as they appear just before an exchange of bags is made. The bags on the car are attached to a ring D, 14 in. in diameter, which is hung on what may be called the rear end of a horizontal bar. A spring, F, fixed to this bar keeps the ring from falling off, and another spring, E, holds it in the

justed to wait for a train, clears the track several inches more than is usual in ordinary cranes. The man in the car is considerably relieved by not having to watch some time before reaching a station for a suitable place to



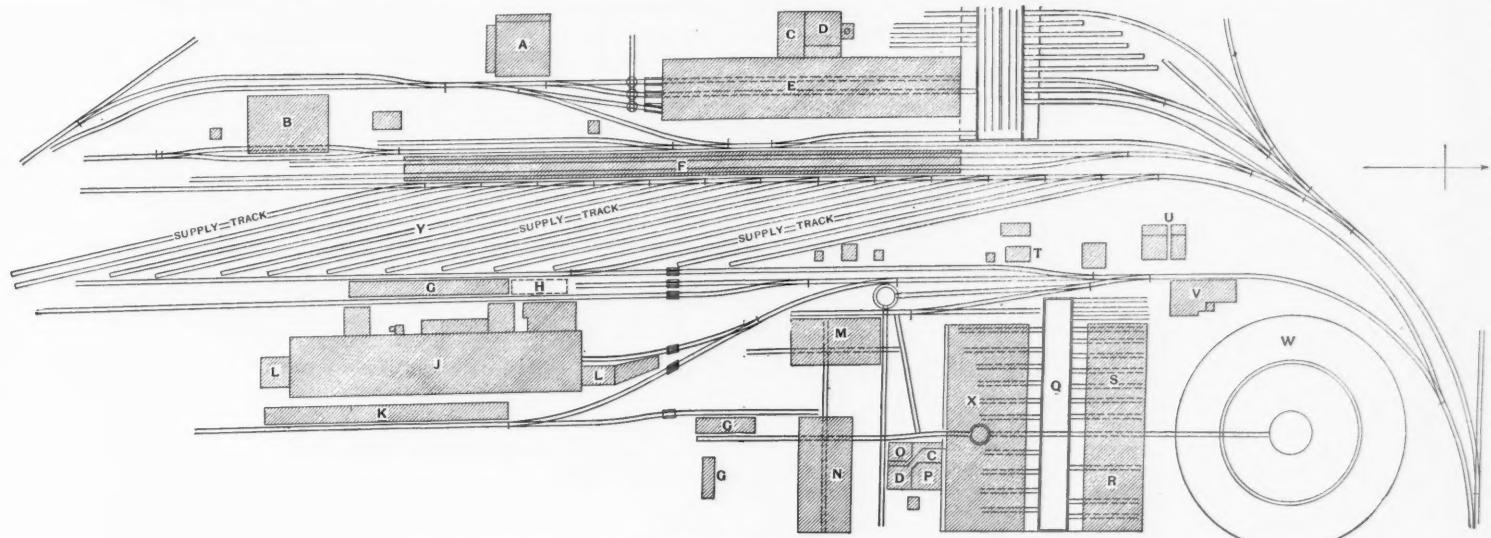
Fleming's Mail-bag Catcher.

throw off the bag. The convenience of the attendant at the station is also promoted.

This catcher has been in use for several months on the Western New York & Pennsylvania road and has been tested by railroad and post office officials, who express marked satisfaction with it.

Foreign Railroad Notes.

There has been a good deal of growling in Austria because the State Railroads earned only 2.52 per cent. on their cost last year, and because the management requests so large appropriations for new equipment, etc. But the country was eager for the law establishing the great reduction of fares by the zone system and for a considerable reduction in freight rates after, and the Parliament is in



Repair Yard—Chicago, Milwaukee & St. Paul, at West Milwaukee, Wis.

A.—Dry Kiln.
B.—New Wood Working Shop.
C.—Engine Room.
D.—Boiler Room.
E.—Wood Working Shop.
F.—Car Shed for heavy Repairs.

G. G. G.—Fuel Shed.
H.—Scrap Iron.
I.—Wheel Foundry, General Foundry.
K.—Sand Shed.
L. L.—Cleaning Shed.
M.—Iron Store Room.

N.—Blacksmith Shop.
O.—Coal Room.
P.—Tool Room.
Q.—Transfer Pit.
R.—Tin Shop.
S.—Tank Repair Shop.

T.—Carpenter Shop.
U.—Ice House.
V.—Brass Foundry.
W.—Roundhouse—44 stalls.
X.—Machine Shop.
Y.—Light Repair Yard.

ment, certain important jurisdiction in the regulating of many public and semi-public institutions, and the Railway Department of the Board of Trade is represented by four men with the title of "inspectors," who have heretofore been appointed from retired army officers of the Engineer Corps.

Until recently the Board of Trade, unlike our Interstate Railway Commission, has paid far more attention to the regulating of the methods of operation than to any matters concerning rates, and by special acts of Parliament, the Board of Trade has been empowered to compel the railways to adopt a block system on all or any part of their lines; or to compel them to provide interlocking for switches and signals; or compel the use of automatic brakes on all passenger trains, and has been given unlimited power in the way of compelling railways to furnish information of all kinds, regardless of expense. On the whole, the Board of Trade has used these powers conservatively and judiciously, and in many cases they have simply made recommendations as to what in their opinion was the best practice.

The principal power of the Board of Trade in the matter of regulating signals comes from the fact that they will not allow any switch and signal plant to be put in or altered and then used without their final sanction, so that after any such plant is completed, the Board of Trade sends an inspector to look it over, and the railway is compelled, if necessary, to make the plant satisfactory to the Board of Trade.

On all new lines of railways, or extensions of old lines, the Board of Trade exercises a very full control in almost every detail of its method of operation and construction. Hence, it is not remarkable that the railways of England have used, generally speaking, a uniform system of signalling, and to this extent at any rate, the Board of Trade's regulations have been useful to the railways at large.

proper position to engage with the horizontal arm B attached to the crane. This latter arm stands parallel with the track and is supported by the arm H, pivoted to a swivel turning on the post. The bags to be taken up by the passing train are hung to the ring C, which hangs on the bar A. The horizontal bar attached to the car engages with this ring and takes it up, with its load, at any speed; as the train passes, the ring D catches on the arm B which drops close to the post, its supporting arm H being released when ring C is detached. The motion imparted by the moving car causes the swivel to turn so as to swing the bag away from the track. It will be seen that the apparatus attached to the car door is fastened at the right hand side by a loose pin running through the lips of the socket. By pulling out this pin the catcher may be quickly swung out of the way to permit the convenient loading and unloading of large bags at stations.

The inventor claims that the mail cranes now in use can be made suitable for this apparatus at a cost of \$2 each, and that the changes will not interfere with the use of the catchers now usually fitted to mail cars.

The most prominent advantage of this device over that in ordinary use lies in the fact that the bag delivered from the train is secured. As everyone knows, bags thrown off upon the ground often strike bystanders, doing injury, or fall under the wheels of the train, damaging the contents and sometimes derailing a car. The rings and arm are so proportioned that a bag, when ad-

justed to wait for a train, clears the track several inches more than is usual in ordinary cranes. The man in the car is considerably relieved by not having to watch some time before reaching a station for a suitable place to

There is a state railroad school in Buda-Pesth, Hungary, which is nearly eight years old. Instruction is given every week day from 3 to 8 P. M., the subjects taught being construction, traffic, telegraph and commercial service, railroad geography, history and law, railroad computations and bookkeeping, the technology of goods and materials, and the German and French languages.

The Sicilian Railroad Co., which works nearly all the lines on the island, paid average yearly wages of \$185 each to its 3,844 employees last year.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Officers of the Trunk Line and Central Traffic roads met at Buffalo last week and agreed to abolish ticket commissions on eastbound passenger business after December 31; and from the tenor of the expressions of the men who were present there seems to be more ground for hope that the agreement will be maintained than has generally been the case. Agreements which soon go to pieces have been so common that they excite nothing but ridicule; and the only important reason for believing that this is not one of that kind is that the Canadian Pacific has signed it. That is a significant change, however, for that road has always been exceedingly independent. Other roads that have been more noted for kicking out of the traces than for anything else, have also joined, and the present rose-colored predictions seem to be concurred in by Messrs. Goddard and Farmer, so that every one will be glad to take the present promises at their face value. The two gentlemen named visited Montreal for the special purpose of securing the Canadian signatures, and the result is characterized by the other traffic men as "splendid." If now the metropolis of the interior would only turn out a few more train loads of passengers for the Atlantic seaboard, so that the competing agents would not have to fight so strenuously for their board and clothes, we might hope that commission payments would be permanently reduced. If everything goes smoothly the abolition of westbound commissions will soon be acted upon.

The returns of gross earnings for September from 129 roads, which we published six weeks ago, showed a loss from last year of 6.22 per cent. The *Chronicle* now gives us gross and net returns for 141 roads for September and for 168 roads for the nine months to September 30. These roads lost in gross 6.26 per cent. for the month and 12.6 for nine months; in net the loss was 14.01 per cent. for the month and 11.6 for nine months. We are all expecting these relative decreases to appear in October also, and in November too, but perhaps to a less degree; but the influence of the World's Fair will cease to be felt and we may hope to see relative gains—small, but still gains. Even that would not mean prosperity, for the comparisons will be made with a very bad year. We have seen that as compared with 1893, the decrease in earnings was.

	Gross.	Net.
September.....	6.26 per cent.	14.01 per cent.
Nine months.....	12.6 "	11.6 "

But comparing 1893 with 1892 the losses were:

	Gross.	Net.
September.....	10.3 per cent.	8.8 per cent.
Nine months.....	0.6 "	4.0 "

The heaviest loser in gross was the Burlington (\$690,349), closely followed by the Reading (\$658,414), the Atchison (\$631,978), and the Illinois Central (\$585,557). In net the heaviest loser was the Atchison (\$758,711), followed by Illinois Central (\$411,183), Burlington (\$348,747), and Reading (\$326,519).

Coal Consumption of Engine 999.

Last July Mr. William Buchanan, Superintendent of Motive Power of the New York Central, made

a test of the efficiency of engine 999 when hauling the Empire State express, in order to get some accurate data for Mr. J. A. F. Aspinall, of the Lancashire & Yorkshire Railway, who is "Reporter" on high speed locomotives to the International Railroad Congress. These tests are very important and they show the pleasing fact that the fuel used per ton-mile of total train is less than is common in the best European practice. There are two reasons for this; one that Mr. Buchanan has designed a good locomotive, and the other that the conditions and fuel are favorable for economy.

The following table gives the weight of the train, fuel used, etc., in the tests. The tons are of 2,000 pounds:

Weight of engine and tender in working order	102 tons
Average weight of train, not including engine and tender	209.6 tons
Average weight of train, including engine and tender	311.6 tons
Actual total running time	76 hours and 12 minutes
Total train miles	3,848
Total mileage without train	26
Total mileage	3,874

Average speed in miles an hour	50.5
Coal consumed, excluding kindlings	59.7 tons
Coal per train-mile, excluding kindlings	31.04 lbs
Coal per train-mile, including kindlings	32.38 lbs
Ton-miles, excluding engine and tender	807,000
Ton miles, including engine and tender	1,200,000
Coal per ton-mile, excluding engine and tender	0.148 lbs
Coal per ton-mile, including engine and tender	0.100 lbs

To learn the consumption of the engine when without a train, a trip was run between Albany and Syracuse and return on the same schedule as with the train. The following are the results:

Mileage	296
Weight of coal consumed	1.9 tons
Coal per mile	12.87 lbs
Total ton-miles	30,000
Coal per ton-mile, engine and tender only	0.126 lbs

The fuel used in this test had the following analysis: Water, .25 per cent.; volatile matter, 32.01 per cent.; fixed carbon, 62.96 per cent.; sulphur, .48 per cent.; ash, 4.30 per cent. The incombustible matter, including water, was therefore 4.55 per cent. The coal analysis is important as attempts are often made to compare the efficiencies of locomotives using different kinds of fuel, but this cannot be fairly done unless the fuel analysis is given and the mechanical value of the fuel determined; this matter is not fully appreciated. Those who criticise the operating departments of Western roads for using so much fuel per ton-mile in comparison with some Eastern roads will find some useful figures in the following table in which is given the analysis of four varieties of Western coal and of the Empire State fuel, for comparison:

	Empire State.	Smokeless.	No. 1.	No. 2.	No. 3.	No. 4.
Moisture	.25	1.12	4.45	4.58	8.49	7.84
Volatile matter	32.49	24.13	39.19	35.52	33.63	31.94
Fixed carbon	62.96	72.20	44.05	45.52	44.12	41.11
Ash	4.30	2.55	12.31	14.38	13.76	19.11
Total non-combustible	4.55	3.67	16.76	18.96	22.25	26.95

The second variety of coal, marked "smokeless," is used on some roads within the Chicago city limits and is even better than the coal used on the Empire State Express.

Some very remarkable work has been done by the 999 class of locomotive, not only in fast service, but with heavy trains as well. In August of this year a train of 15 cars was hauled from Albany to New York in three hours and twenty minutes, a distance of 143 miles, or at the rate of 42.9 miles an hour. It is not known how much fuel was used per ton-mile on this trip. The train weighed, without the locomotive and tender, 1,197,950 pounds, or 599 tons, and with the engine and tender 701 tons. The train was made up of six drawing-room cars, three sleepers, five coaches and a buffet car.

State Control and Parallel Roads.

The New York State Railroad Commissioners have refused to grant an application to build a new railroad parallel to an old one. This is a kind of State railroad regulation which we do not often see, and it is worth special notice. The proposed road is the Amsterdam, Johnstown & Gloversville, and the particulars of the case will be found in our news columns. The proposed line would extend from Amsterdam westward, parallel to the New York Central to Fonda, about 10 miles, and then northward parallel to the Fonda, Johnstown & Gloversville, five or six miles. The new line is claimed to be a little shorter than the existing roads.

This territory must be a specially favorable place for competing roads, or else it is well supplied with capitalists. The Fonda, Johnstown & Gloversville has been in existence 20 years or more and we have always been innocent enough to suppose that it could afford all reasonable facilities for the

towns on its line, but for some reason a parallel electric line was built two or three years ago, and now the present projectors want to lay a third line. On the east-and-west portion of the proposed new route there are only two roads, the New York Central and the West Shore, but one of them has four tracks, so that together they ought to be able to accommodate the public fairly well. As the commissioners well say, if their prices are not reasonable, there is a better method of curing the evil than by inviting superfluous competition.

Refusals of this kind have been rare in this country. We recall none outside of Massachusetts, and not more than two or three in that State. The Massachusetts Commissioners, with true judicial instinct, have generally refrained with great care from deciding any question that it was not necessary to decide, and they have therefore never issued any very exhaustive discussion of the principles involved in a question of this kind. In one case they refused a certificate to a proposed new road because its construction would necessitate a large number of grade crossings with highways, thus running directly in the face of the enlightened general policy of that State, which is to reduce rather than increase the number of these dangerous places. But the projectors of the road turned at once to the Legislature and got a special charter without any trouble. Quite likely these New York applicants may adopt the same course. Everyone is hoping that the New York Legislature will be much better this year than it has been for a long time past; but unless it is decidedly above the level of the best Legislatures everywhere else in the United States, the task of securing its favor will be an easy one. It is hard to convince the "average" member that in granting a charter for a new railroad the Legislature is not doing "the people" a real benefit.

The New York Railroad Commissioners ought to publish in the newspapers a clear statement of their reasons for withholding consent to the Amsterdam scheme. It is said that the existing lines charge nine cents per ton per mile for some kinds of freight; but who can say that that is too high? No one can tell without investigating the whole traffic of the road, the value to the community of the service, of different kinds, which the road performs, and the expense and risk borne by the owners of the road. All these elements should be elucidated by the Commissioners and the facts placed before the public. The commissioners should do this as a matter of education, not asking the public to content itself with their official word for it. If the existing lines are giving good service at reasonable rates they deserve a public statement of the fact from an impartial source. With such a certificate to back them up, they could make a good fight against the new road wherever it appears, whether before the commissioners or in the Legislature.

English and American Signal Practice.

The report of the proceedings of the last meeting of the American Railway Association has just been issued. The principal thing to be found in it, which was not reported in the *Railroad Gazette* of Oct. 26, is a paper on English Signal Practice, by Mr. F. A. Delano, of the Chicago, Burlington & Quincy. This we print in full on another page. To those who carefully read the *Railroad Gazette* and remember what they read, but few of the facts in Mr. Delano's paper will be new, but the article is of special value as an "up-to-date" summary of the principal details of English practice, and because it is made by an American railroad officer who is one of the most intelligent in this particular department. We have had good papers on English signaling—or, rather, scraps of information—by American railroad men who went over there, but who inspected signals as a side-issue; and we have had good papers by Englishmen or others who did not see everything through American eyes; but here we have the subject presented in just the light that the great majority of American readers, who are interested in this subject, would put it themselves if they were to make such an inspection in person.

While we expect every one interested to read Mr. Delano's paper, we will mention a few of its salient points. In almost the first paragraph he exposes one of the infelicities in the recent work of our signal committee, the false distinction between a block signal and a semaphore which is usually used to protect a switch. The distinction should be abolished, of course. This would call for a slight change in the wording of the definitions printed on page 59 of the Proceedings.

In speaking of the absence of special signals for train orders in England Mr. Delano gives no opinion, and

the bare statement of facts might lead Americans to decide that the use of a separate signal for this purpose, at a station where blocking is done, is unnecessary; and that the note at the bottom of page 18 of the *Proceedings* ought to be modified. We are not sure that this would be right in all cases, and it certainly is not well to lay it down as a permanent principle that we need two or more kinds of fixed day signals for positively stopping a train. But at the same time the great convenience of having a signal which tells the trainmen that they must go into the telegraph office is a thing not to be lightly thrown aside and the note at the bottom of page 18 ought perhaps to be made to apply to all three of the block systems specified by the committee instead of only to the automatic.

In referring to the general use of small revolving disk signals in England, Mr. Delano assumes that they have gone out of fashion in this country; but it is well to remember in this connection that signals of this pattern are still used with satisfaction in the very busy yard of the Grand Central Station in New York City.

Mr. Delano was unsuccessful in getting the Englishmen to argue in defense of their recent adoption of green lights for all-clear, in the place of white. Although these men have the usual and thorough English conservatism, they have made this change very quietly, and they seem to assume that the arguments in favor of it should be taken for granted. The reasons for the use of green are familiar to our readers. In regard to the danger of breaking a red glass, Mr. Delano himself is satisfied that glass in which a wire screen has been embedded is perfectly safe from breakage. It will be noted, though, that a member of the convention had seen one of these wire glasses with a hole in it an inch in diameter. In regions where sportsmen with surplus ammunition use signal lamps for rifle practice this might be an objection worth noting.

The fourth paragraph under the head of "color" should be especially noted. One of the most vicious principles, and one which we are constantly liable to follow without thinking, is to make rules on the assumption that a signal is to be treated differently in the country from what it should be at a busy station. The application of this to America is that if a switch engine is allowed to work on the main track without a flag, under the protection of a semaphore, in Boston, New York, or Philadelphia it ought to have the same right in Charlton, Waldwick or Glen Loch.

The information given in the first paragraph under "placing signals" is one of the points which we think justifies the remark made by several at the convention, that English practice is not in all respects as good as ours. There are plenty of signals in this country which stand on the wrong side of the track, so placed in order that runners can see them well from a distant point around a curve; but, as intimated by Mr. Delano, it is sometimes difficult in such cases to tell which signal you are looking after; and it is to be hoped that as we come to better appreciate the value of distant signals and to use them more, this practice will be abandoned. When there is a dense fog the engineman can see around a curve as well as he can in a straight line—that is, he cannot see at all—and if signals are not sufficient for all purposes in times of fog what are they good for? A somewhat similar criticism might be passed on the practice of putting semaphores on posts 45 ft. high. If the distant signal is so far off that the runner must worry about the home signal for some time after he passes the distant, why not have another distant half way toward the home? Then we should suitably provide for foggy weather, when the higher a signal is the less is its value. The practice shown in paragraph D under this head is to be attributed, of course, to the fact that large numbers of costly signals cannot be changed in a day. There can be little doubt that the practice of having a single post with few signals will survive as the best in America, and for similar reasons it should come into general use.

Mr. Delano's paragraph on distant signals in England should be taken, we think, as a just criticism on the American practice of which he speaks. It is true, generally, and we believe universally, that distant signals in this country are used in precisely the same way that they are in England; that is, to tell the engineman the position in which he may expect to find the home signal (although, as we have several times pointed out, the English Clearing House Code and the rules of most American railroads contain the absurd requirement that the engineman must be able to stop at any point after he passes the distant, a requirement which, it is needless to say, is not enforced). But in the use of a caution indication at the home signal post, a practice which is prevalent on some roads in this country, we are, indeed, charge-

able with something very like inconsistency. On the Pennsylvania lines, where there are three-position semaphores, this caution indication is given in a way sufficiently distinct, perhaps, from either of the two indications given by a distant signal; and on the Chicago, Burlington & Quincy, where, we believe, a dove-tail arm is fixed on the home signal post, a similar practice prevails, but with one of the Burlington's posts, which may be exactly like a Westinghouse pneumatic post, the indication given is very different from that given by the latter. It seems to us that we may well consider whether we ought not to adopt the simple English practice of giving a hand signal when it is desired to indicate caution at a home signal post. We do not need to use permissive blocking with passenger trains any more than the English do, and we have no doubt that Yankees can readily find a way to safely communicate with an engineman verbally when necessary without bringing a heavy freight train to a full stop. At all events, if our discipline is so poor that we do not dare to do this, lest laxity be encouraged, let us improve the discipline. Nothing said by Mr. Delano under this head would interfere with the very simple solution of our distant signal problem, which was presented in these columns three weeks ago and was commented upon by Mr. A. H. Johnson last week.

As to the possible danger spoken of by Mr. Delano, that an engineman might mistake one signal for another where two are seen together and one of the lights is burning dimly, it seems to us that an effective precaution, as good perhaps as either of those spoken of as in vogue in England, or perhaps to be used in connection with those, is to put both signals on the same post. If we mistake not, the Board of Trade has made some recommendation on this point. A distant signal which is located back far enough to be somewhere near the starting signal of the next tower in the rear, should be placed on the post with that signal, and be extended farther (or not so far) in order to accomplish this. Both being at the same point, no runner would have any excuse for passing the place without seeing both.

On the whole, Mr. Delano's paper should afford the basis of a good deal of intelligent discussion at the next convention. Details of English practice, whether good or bad, afford a definite starting point of peculiar value, because that practice is of long standing and large in volume; and we ought to make better progress in discussing such concrete things than in talking about definitions of apparatus which ninetenths of the members take only a slight interest in.

The Elevated Railroad Loop Situation in Chicago.

The rapid transit problem in Chicago assumed a new phase last week as the result of the awakening of the several elevated roads to a fact which should have been understood and appreciated from the start, namely, that without a proper terminal, no elevated road can expect to make interest on its bonds, to say nothing of a stock dividend. In the *Railroad Gazette* October 19th and 26th, the necessity for a loop was explained. As indicated there the full appreciation of the vital need for a loop has resulted in a competition between the Lake Street (Yerkes) interests and the Metropolitan interests, and there is now a struggle to see which shall control the loop, for loop there will be. It would appear that the Metropolitan has obtained control of the Alley stock, if not in fact, at least for all purposes of operation on the loop, and these interests are working together to force the Yerkes interests to give them a joint interest in the loop. It has been said that the struggle for the loop is only apparent and that there is already an understanding between the Metropolitan and Yerkes interest, and such a combination as will permit no real competition in operation; but nothing is definitely known about this on the outside.

The addition of a loop to these roads is particularly interesting, as the loop is a long one, and while it will increase the traffic it will also increase the cost of operation. Two independent loops would be cheaper for all and this may be the outcome. The proposed loop has for its north side the Lake Street Terminal, which is now being built from Market street, at the river, east to Wabash avenue. The east side is to run down Wabash avenue to Harrison, thence west on Harrison, and turning to meet the Metropolitan on Franklin or Market streets, thence north to the Lake Street terminal. The "Alley" elevated would join the loop at Harrison, the Northwestern would be crossed at Lake street, between La Salle and Fifth avenue. This location will be made clear by referring to the map of the elevated railroad lines of Chicago given in the *Railroad Gazette* October 26th. The length of this loop that

would be traversed by all trains, or practically all, is about $2\frac{1}{2}$ miles; there would be probably 5 curves and 8 or 9 stations. If the Metropolitan and the two roads now in operation, namely, the "Alley" and the Lake Street, put trains on this loop during the maximum schedule (and of course the maximum schedule must be allowed for, as it is that which makes the profits for the stockholders), the headway between trains on a single loop would be one minute for a three-minute schedule and two-thirds of a minute for a two-minute schedule. If the Northwestern elevated is built the headway would be but half a minute for a two-minute schedule. With a double track loop the headway would be twice as much, but it is not believed that a double track loop will be permitted in the principal streets, as that would require a double post structure, or at least very substantial columns in the middle of the street, and would be quite an obstruction to traffic on thoroughfares that are already overcrowded during busy hours. Taking into consideration the number of curves and stops and the delays due to the small headway between trains, it is not probable that a higher average speed than six miles an hour can be made on the loop. The time to go around the loop would then be 25 minutes; that is the running time for a round trip would be increased by very near half an hour.

It has been claimed that with the introduction of electricity an average speed of 15 miles an hour would be made on the Chicago elevated roads, and this no doubt will be true on the Metropolitan which has a four-track line for the first one and three-quarter miles from the inner terminal, which will enable the trains to be run express during crowded hours. However, 14 miles an hour may be taken as the average speed from the inner to the outer termini, for most of the Chicago roads when they are operated by electricity without a loop. On a basis of 14 miles an hour average speed the round trip on the Alley road as now operated to Jackson Park, about $8\frac{1}{2}$ miles, would be 80 minutes, allowing six minutes delay at both terminals, or three minutes at each. To go round the loop will require 25 minutes more, or an increase in time for a round trip of 31 per cent. The direct branch of the Metropolitan to the city limits is about $5\frac{3}{4}$ miles. This road will make somewhat faster time than the others and the round trip for this branch will be about 52 minutes. An addition of 25 minutes for the loop trip would increase the time for the round trip about 48 per cent. The Logan Square branch of the Metropolitan is about $6\frac{1}{2}$ miles from the inner terminus, a round trip would be about 60 minutes and the loop trip would add about 41 per cent. to the time for the round trip. The Lake Street is now operating about $6\frac{1}{2}$ miles of line to the city limits, and when equipped with electricity the round trip will be about 62 minutes and the loop trip will add about 40 per cent. to the time for a round trip.

The increased running time for one round trip when the loop is built would then be about as follows: Alley, 31 per cent.; Metropolitan, west to city limits, 48 per cent.; Metropolitan, northwest to Logan Square, 41 per cent.; Lake Street, to city limits, 40 per cent. This increase in time for a round trip requires almost exactly the same per cent. of increase in the number of cars, motors, conductors, motormen and guards, and about the same increase in the depreciation and repairs of equipment and some increase in supervision. Probably each road would have to pay its proportionate share of the cost of operating and maintaining the loop, including the stations, ticket sellers, etc.

To learn the effect of the increased cost of operating on the loop one must know the actual cost of operation without the loop, and this varies with the different roads, but for the purpose of illustration it will answer to take an assumed case in which the motive power is electricity and an economical plan of operation is followed, and with rather heavy traffic, supposing the fixed charges to include everything except the interest on the bonds. For such a road the distribution of operating expenses and fixed charges in per cent. of total cost to run is somewhat as follows:

	Per cent.
Depreciation of power station equipment	3.9
Depreciation rolling stock and motors	9.7
Repairs power station	4.9
Repairs equipment	6.1
Motormen, conductors and guards	20.8
Central station help	2.9
Fuel at \$2.00 a ton	15.5
Ticket station help, etc.	7.4
Structure and track repairs	3.7
Switch and signal men and others	0.0
Supplies and miscellaneous	7.4
Superintendence and general expenses	8.7
Total	100.00

Taking the three existing elevated roads in Chicago as jointly owning and operating a loop and allowing 25 minutes for the time around the loop in crowded hours, and allowing the same fuel per car mile on the loop as on the main line, and assuming that each

road pays one-third of the expenses of maintaining the loop and the ticket stations, the following table gives approximately the ratios of the costs of operating with and without the loop:

	Distribution of Cost of Operating Expenses Without a Loop.	Proportional Number Showing the Increase of Cost of Operation Due to Loop.			
		Alley to Jackson Park.	Metropolitan to City Limits.	Metropolitan to Logan Square.	Lake Street to City Limits.
Depreciation of power station equipment....	p. c.	3.9	3.9	3.9	3.9
Depreciation of rolling stock and motors....	9.7	12.7	14.4	13.6	13.6
Repairs, power station.	4.9	4.9	4.9	4.9	4.9
Repairs, equipment....	6.1	8.0	9.0	8.6	8.6
Motormen, conductors and guards.....	20.8	27.2	30.8	29.4	29.1
Central station help....	2.9	2.9	2.9	2.9	2.9
Fuel at \$2 a ton....	15.5	20.2	22.0	21.5	21.5
Ticket station help, etc.	7.4	8.2	8.5	8.4	8.4
Structure and track repairs....	3.7	4.1	4.3	4.2	4.2
Switch and signal men and others....	9.0	11.7	12.8	12.5	12.5
Supplies and miscellanea....	7.4	9.7	10.5	10.3	10.3
Superintendence and general expenses....	8.7	8.7	8.7	8.7	8.7
Total.....	100.0	122.2	132.7	128.9	128.6

The figures in the table are proportional numbers; but if taken as percentages they are not far out, and it may be expected that running trains around a loop in Chicago will increase the operating expenses from 20 to 30 per cent., according to the length of the main line, and will increase the amount of equipment required in about the same ratio. The traffic, then, will have to be increased this amount in order to keep the cost of operating about the same per cent. of the total receipts. It is pretty certain that no elevated road in Chicago will pay a dividend on its stock unless there is a loop to take the passengers where they want to go, and in making an estimate of the increase in earnings that will be derived from an increase of traffic because of the loop, it must not be forgotten that the loop carries with it, in the case of Chicago roads, not far from 25 per cent. increased operating expenses. It is easily shown that it will be much cheaper to operate and almost as useful to have a sub-terminal in the heart of the city.

The figures in the table show that it would be a serious matter for any elevated road that had to pay liberally for the use of the loop, as would probably be the case if it was built by an independent company that expected to make a profit out of it. The apparent fact is that in Chicago the right to build a loop is being asked for by two independent companies, formed not of the railroad companies themselves, but of some of the largest stockholders in those companies. The intention may or may not be to turn the loop over to the Metropolitan and Alley combined or to the Yerkes roads, so that all stockholders may share alike in the advantages. It may be that the present struggle will only be settled by giving all the roads an equal right to the loop, but at present, these being open questions, the stockholders are becoming a little uneasy, as the practical operation of both the Alley and the Lake Street roads has shown that without a loop there is no hope of profit, and the estimates here made show that the roads cannot afford to pay for the use of the loop, more than a fair proportion of the actual cost of maintaining and operating the loop. Including the interest on the bonds the cost of carrying one passenger on an electrically operated modern elevated road, is not far from 3.6 cents with a heavy traffic, but with a comparatively light traffic, such as the Chicago roads have, it is more than 4 cents; therefore a very small charge per passenger for the use of the loop would make a large reduction in the net profits. Within the next 60 days there will probably be some important developments in the elevated railroad situation in Chicago.

Arresting Trespassers on the Pennsylvania.

In speaking, last week, of tramps on Canadian Railroads (page 806) we referred to the Pennsylvania as the road which had done the most to abate the tramp nuisance in the United States. This is true not only of the Pennsylvania proper but of the lines west of Pittsburgh as well, and the results of the company's action on the Cleveland & Pittsburgh Division are quite encouraging; so much so that we asked Mr. Loree, Superintendent of that division, to give us a statement of what he had done. He sends us the following memoranda:

"I cannot give you any statistics as to the number of persons stealing rides on trains prior to July 1, but it must have averaged three or four to each freight train. An investigation made early in November showed 20 persons stealing rides on 59 freight trains and two on passenger trains at the outskirts of Cleveland; 10 on 33 freight trains passing Ravenna (on the main line); and 8 on 19 freight

trains passing East Liverpool (on the River division). Traveling on freight trains has decreased since the rough weather has set in.

"We began operations with our railroad police force on July 1. The following table shows the results to Nov. 15th:

Offence.	No. of Arrests	Disposition of Case.
Jumping on trains in motion and stealing rides.	97	Discharged, 7; average fine in 68 cases, \$7.80; 22 cases fined the costs.
Assaulting brakeman.	2	Average fine \$24.
Trespassing in yard while intoxicated.	1	Fined \$1 and costs.
Destroying property....	5	Fined \$1 and costs.
Breaking into freight cars.	2	One escaped from officers; one, a minor, sent to reform school.
Petit larceny.....	12	Four cases, stealing beer, fined \$8.60; 4 stealing coal, fined \$1 and costs; 4, stealing coal, not yet disposed of.
Total.....	119	107 punished, 7 discharged, 4 not yet tried, 1 escaped.

"Stealing of coal is constant at our large terminal yards. We have tracks extending over some eight miles of territory, and we find it almost impossible to watch it and, as you will see, we receive but little support from the Police Court in punishing the thieves. Not only are the thefts reprehensible in themselves, but there are frequent cases of personal injuries. About one-half of our personal injury cases arise from trespassing. For example, of 13 cases in September last:

No. 1. C. J.—Sprain and bruises to left leg; stealing ride, train coming together catching his leg between two cars on which he was stealing a ride.

No. 2. H. L.—Attempted to uncouple two cars and had his right arm bruised between wrist and elbow.

No. 3. F. M.—Struck by train while walking on track; severe cuts and bruises on head and body.

No. 4. J. N.—Struck by train while walking on track; slight bruises.

No. 5. D. S.—Struck by train while walking on track; killed.

No. 9. V. R.—While climbing between cars had heel of right foot caught beneath chafing blocks and lacerated.

No. 13. C. P.—Found near track with scalp wound and slight fracture of skull. When last seen (about an hour before picked up) he was intoxicated.

"There is, unfortunately, no law in Ohio for the punishment of trespassing. It is time that the railroads, taking care to themselves obey the laws, make a vigorous effort to compel other people to obey them; and to endeavor to have adopted in States where the same do not now exist, such laws as are in force in other States which have proved useful in repressing lawlessness."

As remarked by Mr. Loree, a fine of one dollar for stealing coal does not afford very strong encouragement to the railroad officers to continue their warfare upon the thieves, but it is much better than the acquittals, or failures of justice, so common elsewhere. Perhaps we may hope that the magistrate is beginning mildly with a view to the employment of severer measures after the habitual thieves shall have received good warning.

The bills for the transportation of troops to and from Chicago at the time of the riots in that city last summer have just reached the seventeenth assistant auditor of the War Department, or some other petty officer there, and an item was printed in the press dispatches throughout the country last week that this officer would oppose the payment of the bills on the ground that, as the railroads were the beneficiaries of the service performed by the troops, they ought not to ask pay for transporting them to and from the scene of action. As this item bore the usual ear-marks of the petty officer who has to indulge in twaddle of this kind to bring himself before the public (or of the reporter who magnifies the remarks of such small fry), we took no special notice of the item; but it seems to have been made the subject of editorial comment by a good many newspapers. Most editors, in the kindness of their hearts, and being exercised by feelings of compassion for our depleted treasury, at once sustained the alleged auditor. The man who enjoys the benefit of police protection, should, of course, be willing to give the police a little aid himself. The question should be decided, apparently, on the same principle that should actuate a man with his vest pocket full of cigars when a policeman drives off a mad dog. If he did not hand out a couple of cigars he would be mighty mean. Likewise, the housewife whose premises are in danger of burning up, would be guilty of the basest ingratitude if she did not treat the firemen to hot coffee. But the New York *Sun* and the Springfield *Republican* kept their heads level and called attention to the real equities of this matter. Suppose the railroads had refused to transport the troops free of charge—would that have diminished the obligation of the authorities to open the lines for public use? A man's right to the protection of the law is unchangeable or the law ceases to exist. It is beyond the power of any mind to conceive of the corruption of the police if the principle were admitted that it could haggle for money from the man in need of its protection. These, and other points, are presented by the *Sun*; and the *Republican* makes the suggestion that the ignoring of these bills would lead to a revival of Pinkertonism, or the private army system. In sending troops to Chicago to enforce the laws, the government was merely doing what it is maintained for doing; the feudalistic idea of government was exploded some time ago.

Pursuing the subject further the *Republican* passes a mild criticism in connection with the fact, stated in the Wright report, that the deputy marshals sworn in and paid by the government at Chicago were railroad employés, were armed by the roads, and acted in the double capacity of railroad employés and government officers; and concludes that as this is bad practice for the government, the government cannot consistently condemn it unless it first clears its own skirts by fully bearing its own part, in such a matter as paying the soldiers' railroad fare. But our esteemed contemporary should bear in mind that railroad employés are presumably law-supporting citizens and therefore suitable candidates when a marshal is in straits for deputies. The ideal way, of course, is to have marshals perfectly independent as between different factions of citizens; but practically, when several hundred deputies are wanted at once we must take what we can get. The railroad police laws of Massachusetts and other states afford presumptive evidence that railroad employés are "discreet citizens," who may be trusted with authority to arrest rioters, and we may be sure that the Chicago railroad officers who recommended or allowed the appointments referred to, saw to it that anarchists were not included in the list. Our contemporary's reference to the matter is entirely based, we surmise, on the erroneous assumption that the railroad employés who were armed were men who would defend "capital" (the railroad company) too zealously; but there is no evidence whatever that the marshal made any mistake in appointing railroad men as deputies. Of course the people "cannot afford to let the railroads exercise the power of government;" and they have not.

On Tuesday of last week a sensation was created in Wall street by the announcement from Boston that the Burlington directors had decided to pay a dividend of 1% per cent. for the quarter, followed an hour or so later by the announcement that the dividend declared was one per cent. The result of this juggling was speculative transactions in about 93,000 shares of Burlington stock, in which somebody made and somebody else lost, a good deal of money. The price jumped up to 74%, then declined to 70%. The only explanation that has been given is that some unknown miscreant in Boston telephoned to a Boston news agency, which sent the news to New York, imitating the voice of the manager of that agency and saying that the dividend was to be made 1% per cent. This explanation strikes us as being very inadequate. It is preposterous that an agency for the transmission of news that can have such serious results on men's fortunes should take so little pains to verify so important an item before sending. It is unfortunate, furthermore, that it should be possible for anybody to believe that some of the Burlington people themselves were influential in the transmission of the false information. They may think it undignified to take any pains to convince the public that they were not implicated. If they choose to sit down under the suspicion they will have to stand the results and perhaps they think that they can afford to do so. We would not be understood as having the slightest doubt of the integrity of everybody who had official access to information as to the action of the Board, but it seems as if a pretty full explanation was due to the public, or at least as if it would be for the interest of the gentlemen concerned to make such an explanation.

It seems to be settled that the Old Colony Railroad officers who are in jail must stay there to the ends of the terms for which they were sentenced; Mr. Sanborn for four months and the others for two months. The other four are C. S. Bailey, railroad police officer; A. L. Fraser, foreman of the blacksmith-shop; E. H. Bryant, roadmaster, and John Bolen, section foreman. The petitions for and against the granting of a pardon had to go before the Governor's Council of eight members and by that body were referred to its pardon committee of five members. Of this committee, three, including the Lieutenant Governor, voted against granting a pardon, and so the question does not come squarely before the Governor at all. The gist of the matter, as far as the crime itself was concerned, is the same as was stated in the first reports, nothing new having been brought out. The principal argument in defense of the action of the men was that they were carrying out the orders of superior officers. As nothing is said on behalf of these superiors it is probably safe to assume that in this, as in most cases of the kind, their orders were to use force just as far as could be done without running the risk of getting into jail; and the critical question, how far this should be, of course had to be decided on the spur of the moment in the thick of the fight, by the men on the ground. Substantially the only argument presented by the counsel for the men was that it was unjust to convict without a trial. The accused would never have abandoned their fight for vindication and thus relinquished their right of a trial by jury, had it not been for the misunderstanding with the District Attorney on this point.

The roads west of Chicago and the Central Traffic lines are again endeavoring to secure the adoption and maintenance of a "pass agreement," similar to the one put in effect by the western lines in January last. The present agreement does not differ much from the old one, except some of the provisions of that agreement which were thought to have furnished an excuse for some of the lines to issue passes which resulted in its collapse are

eliminated. There again seems to be a reasonable prospect of the successful putting into operation of the agreement, but it is said that some of the parties who have already signed have "hitched strings" to their signatures and may pull them in before January 1. The great trouble is probably that one-half of the lines expect that the other half will do something that can be construed as warranting them in breaking the agreement, while at the same time posing as most virtuous and law abiding people themselves. Being on the lookout for a pretext for issuing a few passes, they are quite ready to seize the first opportunity to do so without investigating, for fear they may find that their information is erroneous. There ought not to be any necessity for this agreement, but as the necessity does exist it is to be hoped that those railroad officers who so deplore the pass evil when they are moralizing on the subject will be equally courageous when applications come in from shippers who claim to have just got passes from some other road. If such an applicant must be placated, why not reduce rates for him? Giving passes is reducing rates.

TECHNICAL.

Manufacturing and Business.

The new works of the Westinghouse Electric & Mfg. Co., at Brinton, Pa., are now being fitted with machinery, and manufacturing will be commenced immediately. The company has at present unfilled orders exceeding \$1,500,000. In view of the concentration of all of the manufacturing departments in one plant, the following changes have been made: W. F. Zimmermann, formerly Assistant General Manager, has been made General Eastern Agent, with offices at No. 120 Broadway, New York; W. C. Clark, formerly Assistant Treasurer and General Agent, has been made Assistant General Manager, with office at Pittsburg; George H. Lewars, formerly Treasurer of the Consolidated Electric Light Co., has been elected Assistant Treasurer, with office at Pittsburg; Albert Schmid, formerly Superintendent, has been made General Superintendent, and Philip Lange, formerly Assistant Superintendent in charge of the Newark factory, has been made Superintendent of the Brinton Works.

The Balanced Locomotive & Engineering Co., of New York City, has filed a charter in New York with a capital of \$1,000,000. The largest shareholders are: George S. Strong of New York City, who subscribes for 100 shares and takes \$45,000 additional, to be paid for by property, and Henry F. Taintor, of New York, and Henry G. Morris, of Philadelphia, who, as trustees for the bondholders of the Strong Locomotive Co. take 1,500 shares, which also is to be paid for by property.

The Davis Car Wheel & Machine Co., of Chicago, has been chartered by C. F. Gaylord, J. H. Lee and M. J. Frost; capital stock, \$150,000.

The Henry C. Hart Mfg. Co., of Detroit, Mich., has transferred its entire railroad business to the Dayton Mfg. Co., of Dayton, O. The sale includes all the stock, patterns, tools and patents of the railroad department of the Henry C. Hart Mfg. Co., and the unfilled orders of that department will be completed by the Dayton Mfg. Co. This arrangement gives the Dayton firm a valuable plant and greatly increases its facilities for promptly filling orders.

The Sterlingworth Railway Supply Co., of 256 Broadway, New York, is in receipt of a letter from General Superintendent Brown, of the Fall Brook Railroad, expressing his satisfaction with the Sterlingworth, formerly the Canfield switch stand. These stands have been in use for over two years on the Fall Brook Road, and over 100 of them are now in the tracks, so that Mr. Brown's approval is given after a long demonstration of their merits. The patented automatic locking device he speaks of as a particularly valuable feature. The stands have not only by long use, proved satisfactory in ordinary use, but have been repeatedly subjected to the severest tests and have never failed in any degree. The stands have been adopted on the Fall Brook Road. The Sterlingworth Supply Co. is introducing the Sterlingworth steel body bolster and Player brake beam, which will be known as the Sterlingworth brake beam. The firm has the exclusive agency for the railroad trade of the well-known Magnolia journal metal.

The Penn Bridge Co., Beaver Falls, Pa., report orders coming in well. The following contracts for iron buildings and roofs are under way: Addition to rolling mill building of the Pittsburgh Reduction Co., New Kensington, Pa., 70 ft. x 35 ft.; addition to mill building of Ohio Steel Co., Youngstown, O.; addition to the tin plate plant of New Castle Steel & Tin Plate Co.; roof trusses of building, 60 ft. x 100 ft., of Niagara Falls Brewing Co.; roof trusses for two pump houses of United States Government, Louisville, Ky.; roof for boiler house, West Virginia Central & Pittsburgh Railway, Cumberland, Md.; roof for power house of Beaver Falls Electric Light Co.; steel beams and columns for new works of Carborundum Co., Niagara Falls, N. Y. The company has commenced the erection of a new steel mill 60 ft. x 280 ft. for the Union Iron & Steel Co., of Youngstown, O.; roof trusses for transforming room of Cataract Construction Co., of Niagara Falls, the size of transforming room being 40 ft. x 90 ft.; also roof trusses for boiler house at the United States Navy Yard, Annapolis, Md.

Iron and Steel.

The steel works in the Chester district are showing much activity in production at present. The American

Steel Castings Co.'s plant is running until 10 o'clock at night. The works of the Crum Creek Steel & Iron Co., which have been idle since last year, have resumed operations, employing 75 men. The Chester Steel Castings Co. is crowded with new orders and a large addition has been contracted for which will double the capacity of the works. The Eureka Steel Castings Co., which is in the hands of an assignee, will be operated to finish up orders now on hand, and the Wellman Works, which will be sold on Dec. 15 at receiver's sale, will be bought in probably by a syndicate which will operate the plant to its full capacity.

The National Foundry & Pipe Works Co., of Scottsdale, Pa., has contracted with the Shiffler Bridge Co., of Pittsburg, for the erection of a foundry building 80x301 ft., a pipe-cleaning shed 30x301 ft., and a cupola houses 26x35 ft. The buildings will be constructed of iron and are to be completed within 90 days. The Industrial Works, of Bay City, Mich., secured the contract for furnishing four 30-ton cranes and one 10-ton locomotive crane. A boiler and engine house, also of iron, will be built, but the contract has not been let yet.

The Bridge and Construction Department of the Pennsylvania Steel Co., of Steelton, Pa., is said to now have enough orders on hand to keep that department running full until next March. One of the most important contracts is for the iron work of the new Ninth Regiment Armory in New York City. The superstructure for several large bridges is also being built at these shops. Important changes are to be made in the bessemer rail and blooming mills of the Steelton plant. A large electric crane will be installed in the bessemer mill to handle the ladles and moulds.

New Stations and Shops.

The Berlin Iron Bridge Co., of East Berlin, Conn., has just completed for the Baldwin Locomotive Works, of Philadelphia, steel roof trusses for the addition to its wheel shop.

The Berlin Bridge Co. will furnish the new power station for the United Electric Light and Power Co., on East 28th street, New York City. The power house is 100 ft. x 200 ft., and the engine room 80 ft. x 100 ft.; the boiler room is 56 ft. x 100 ft., the whole covered with the Berlin Bridge Co.'s patent anti-condensation corrugated iron roofing. The coil pockets in the boiler room have a capacity of 3,000 tons.

The architects have submitted plans for the large station for the Staten Island Rapid Transit at St. George, Staten Island, and General Superintendent Gannon will shortly advertise for bids for constructing the same. The new building will be a two-story structure. On the second floor will be located the offices for the Superintendent and Chief Engineer. The waiting room will be 50x75 ft., and adjoining it will be a restaurant, 42x45 ft.; a reading room, 30x55 ft.; a smoking-room, 20x25 ft.; a ladies' waiting-room, 20x25 ft., and an express room, 70x70 ft. The new building will cost about \$150,000 to finish, and double that amount has already been spent on the new dock and ferry slips. The location of the new building is south of the present landing for boats from New York.

The appeal of the Grand Trunk Railroad for the assessment of the Bonaventure station property in Montreal by the City Assessors at \$700,000 has come to an end, the company having accepted the assessment given in the Recorder's court. The amount is \$654,710.

The Baltimore & Ohio Railroad is to erect repair shops at the junction of the Pittsburg & Western and Lake division, a short distance east of Warren, O.

The Dayton Union Railway Co. has made a proposition to the city Council of Dayton to build a new union station to cost \$100,000, and to expend \$100,000 each in the elevation of tracks through a portion of the city and eliminating grade crossings, provided the city will pay the damages to adjacent property on account of the changes in streets and tracks which may be made necessary. This proposition has not yet been acted upon by the city, and plans of the proposed station will be delayed until it is determined what action the city will take. The Dayton Union Railway Co. has been organized by the Cincinnati, Hamilton & Dayton, the Pittsburgh, Cincinnati, Chicago & St. Louis, and the Cleveland, Cincinnati, Chicago & St. Louis.

The Ohio Southern road is considering the matter of moving its shops from Springfield, O., and there is considerable competition among other towns and cities along the road to secure them. An effort is to be made by Springfield to retain the shops at that city.

The Chicago & Eastern Illinois shops which have been at Brazil, Ind., it is announced will be removed to Momence, Ill., and some of the machinery has already been removed to the new site. Small shops will continue to be maintained at Brazil. The removal of these shops to the latter town was decided upon by the company soon after the railroad strike in June on account of the failure of the town authorities of Brazil to maintain proper police protection during the strike.

The new station of the Philadelphia & Reading at Frankford Junction, north of Philadelphia, was opened last week. The station is a handsome building of two stories. The waiting room is on the second floor and very attractively fitted up, the ticket and express offices being on the ground floor.

Tests of Baldwin Compound in New Zealand.
The Wellington & Manawatu Railway Company in New

Zealand, received lately two compound locomotives from the Baldwin Locomotive Works. One is a consolidation freight and the other a ten-wheel passenger. The consolidation was tested in comparison with a single expansion engine, weighing about 10 per cent. less than the compound. The boilers were about the same in diameter, but the firebox heating surface was greater for the compound, the difference being about 7 per cent. The steam pressure on the compound was 180 and on the single expansion engine 135 lbs. per square inch. The results of the tests show a saving of 25 per cent. in favor of the compound under the conditions here outlined, which of course do not show that the single expansion engine was in the best form possible. The results, then, indicate not what the compound will do when compared with a single expansion engine under equal conditions, but that the compound will make an important saving when compared with a single expansion locomotive of ordinary design using low steam pressure. In most cases where compounds are compared with single expansion engines there are two classes of savings. One due to the improvement in design and general construction and the other due to compounding *per se*. With the present knowledge it is impossible to draw the line so that one can say how much of a given saving is due to each of these factors.

The Northland.

General Manager F. P. Gordon, of the Globe Iron Works, of Cleveland, which is building the Great Northern Steamer Northland, a sister ship of the Northwest, states that the ship will certainly be completed in time for the opening of the passenger business for the Great Lakes next season. The Ship Building Company has not been doing any work on the ship for several months. It is understood that among the reasons for stopping the work was an important change in the plans of the machinery of the vessel which the operation of the Northwest in service had shown to be advisable. Several hundred men are now at work completing the boat, and as it is more than half finished it is thought that it will be launched in January. In regard to the boilers of the Northwest, which were the subject of some criticism, Mr. Gordon says that the French marine boilers on the boat have proved an eminent success and they have been subjected to a test which few other boilers could have stood. The Northwest ran over 23,000 miles during the season without developing strains, and is as staunch now as when she began service. With the Northland in commission next year the Great Northern Steamship Company will be enabled to have a semi-weekly service between Buffalo and Duluth, instead of a weekly service as was maintained last week.

Pneumatic Interlocking.

The Auto-Pneumatic Railway Signal Co., of Rochester, has received an order for an interlocking plant to be erected at the crossing of the Delaware, Lackawanna & Western and the Western New York & Pennsylvania, at Mt. Morris, N. Y. This company's apparatus, which was described in the *Railroad Gazette*, of Dec. 22, 1893, has been in use in Buffalo for more than a year at a crossing of the roads just named. It is wholly pneumatic, all movements being made either by air pressure or gravity. No electrical apparatus is used and no manual power is required except that necessary to turn the air valves. The semaphores are moved to the all-clear position by air pressure operating in a cylinder fixed to the signal post. The derailing switches are operated by air pressure. The interlocking is accomplished wholly by means of a simple arrangement of air valves attached to the signal lever. Over 150,000 operations have been made with the plant at Buffalo without a failure.

THE SCRAP HEAP.

Notes.

At Los Angeles, Nov. 21, four persons were convicted of conspiracy in obstructing the mails at the time of the strike.

It is announced in the newspapers that the Lehigh Valley has made a reduction in the salaries of all employees receiving over \$1,000 a year.

Railroad Work in Jamaica.

An interesting piece of work has recently been undertaken by an American railroad contractor on the island of Jamaica. That island is one of the colonies of Great Britain and an English company has for some years been building a railroad through the island. The extension of this work involves some extraordinary railroad construction, and it is this work which has been awarded to an American contractor rather than to an English firm. The island of Jamaica, some 150 miles in length by 50 in width, is one of the "Greater Antilles," lying 90 miles southwest of Cuba and about 1,400 miles from New York. It is mountainous; in fact, its mountains are the highest east of the Rockies. Lying within the limits of the torrid zone, its climate is yet healthy and salubrious. The range of the thermometer is small, seldom rising above 85 deg. or sinking below 57 deg. The population is about 620,000 colored to 15,000 white people. The principal products are bananas, chocolate, coffee and sugar. The railroad is to effect communication between the ports on the north and south of the island and enable the planters to get their crops to the seaboard cheaply and expeditiously. The level sections are about completed, but the mountain section of some 50 miles in length has only now been contracted for. Whether the Englishmen felt that the difficulties to be surmounted were too many for them, or that the principles of construction as practiced in this country would produce the best results, does not appear, but the work has been intrusted to an American contractor, Mr. James P. McDonald, of Knoxville, Tenn. In addition to the ordinary construction work, Mr. McDonald has the following extras to his task, viz.: 29 tunnels, 193 girder bridges, 9 truss bridges and 11 viaducts; some of great

size, all of steel and on piers of masonry. All the tunnels are to be lined, and it will require some 200,000 kegs of powder and thousands of cans of dynamite for the blasting to be done. Probably it is safe to assert that no piece of road in this country, of the same length, has as much special work in it as this 50-mile section. Mr. McDonald furnishes all the material, including creosoted ties, steel rails and fastenings, steel bridges and viaducts, also the locomotives and cars. All of these, as well as the timber and lumber, will be purchased for him by the New York Equipment Co. No. 15 Wall street, New York. Active work will soon commence. Mr. McDonald is now making contracts with sub-contractors. About Dec. 10 the first shipment of material will be made on a steamer of the "Kerr line," sailing from Brunswick, Ga. Labor is found in plenty on the island. Material and supplies will be sent forward rapidly as it is the intention of Mr. McDonald to complete the contract by Jan. 1, 1896.

Delaware & Hudson Canal Closed.

Navigation on the Delaware and Hudson Canal between Honesdale, Pa., and the Hudson closed on Nov. 24. An even 100 boats were loaded with anthracite at the Honesdale docks before Saturday, closing the season. The season has been a very unprofitable one to boatmen.

The Trolley at Havre.

The official inauguration of the electric overhead trolley system at Havre, France, took place Sept. 25, and the several street car lines of the city, comprising a total length of about 15 miles of single track, are now operated by electricity. The dynamos are of the 4-pole, Thomson-Houston type, and are driven through rope gearing by Farco-Corliess condensing engines.

Collision at Northallerton, England.

On the morning of Oct. 4 at about 3 o'clock, an express train running about a mile a minute crashed into a freight train at the above mentioned station on the North Eastern Railway of England, making a very bad wreck and fatally injuring one of the engineers. There was a dense fog at the time, but aside from this the accounts we have do not explain the cause; it looks as though the engineer failed to locate the distant signal. The most prominent circumstance connected with this collision is that none of the passengers were killed and only six were seriously injured; and the London *Railway World*, from which we take these facts, publishes prints from photographs showing that the longest car in the train, a Pullman sleeping car, was practically undamaged except at the platforms, which very likely affords the main explanation of the immunity of the passengers. The guard's van and a third-class carriage in front of the Pullman car were crushed like egg shells and the engines and tenders were overturned and tipped around in all directions. As the *Railway World* well says, this should afford a good object lesson as to the value of strong frames for passenger cars. The advantage of these was also demonstrated in the disastrous collision at Thirsk on the same road in November, 1892. Collisions are happily rare on English railroads, but, as must be the case where the block system is used, they are likely to be violent whenever they do occur, and in a violent collision a light passenger car affords little or no protection for its occupants.

Lake Superior Interests.

There has been the past week or two a serious blockade of ore traffic on the roads leading from the Lake Superior mines to the ports of Escanaba and Marquette, there being at the yards at Escanaba alone from 1,700 to 2,000 cars waiting for unloading. This has been serious from the fact that it hindered the free movement of ore to the docks in the last week of the season, and so shortened the total sent forward. It had been the intention to send out 8,000 tons daily all the week.

Ore shipments are now over at all the lake ports, and there are efforts at all the ranges to get in shape for extensive mining operations during the winter. These operations will be far in excess of last winter. It is estimated that there are now employed in the mines of the various ranges not less than 12,000 men. The chief activity is on the new Mesaba, where the mining and shipping of ore next season will be far in excess of what has ever been sent out from any range in any season hitherto.

As illustrating what one of these big iron mines of the Lake Superior region can do in the way of making business, the Oliver may be instanced. It was discovered only about three years ago, and development work began in the fall of 1892. This season it has mined over 500,000 tons, paid \$400,000 to the Duluth, Missabe & Northern road for hauling ore to the docks at Duluth, paid as much more for getting the ore to Lake Erie, turned over \$250,000 to the state and the lessees for royalty, and spent something about the same amount for labor.

For the season to the beginning of November, the St. Mary's Falls Canal has passed 11,748,000 tons of freight, an increase over the season of 1893 to the same date of over 1,500,000 tons. There has been an increase in iron ore of 40 per cent., in lumber of 25 per cent., in flour of 35, in coal of 6, and in other freights a gain as well. It is expected that the traffic of the canal for the entire season will be over 13,000,000 tons, which will be about 2,000,000 tons more than last year. During the season to date 26,613 passengers have been carried through, against 8,396 to the same date a year ago.

An effort is to be made at the coming session of Congress to secure an increased appropriation for the survey of the Lake Superior & Mississippi Canal, the Government engineer wishing to get fuller data to settle the question of its practicability.

The Cotton States' Exposition at Atlanta.

Mr. Grant Wilkins, C. E., as Chairman of the Building Committee of the Cotton States & International Exposition, which is to be held at Atlanta, Ga., in the last three months of 1895, has just made the awards for building the foundations for several of the buildings. The contract has been given to the General Construction Co., whose total bid for the foundations for four buildings, the Agricultural, Mines, Forestry and Electricity Buildings, was \$1,964. The dimensions of these buildings were given in a recent note in the *Railroad Gazette*.

Sealed proposals for furnishing material and labor for the erection of the superstructure of the Manufacturers, Machinery, Agricultural, Electricity and Forestry Buildings, will be received at Atlanta, Ga., until Dec. 10. All proposals must be made upon blanks furnished and addressed to C. A. Collier, President.

Plans and specifications will be on file at the Exposition Company's office, Atlanta, also at the offices of Bradford L. Gilbert, Supervising Architect, in the Equitable Building, Atlanta, Chicago, Boston, and the Tower Building, New York.

LOCOMOTIVE BUILDING.

A company called the White Locomotive Works was recently incorporated in West Virginia with a capital

stock of \$2,000,000. Nothing has been published in regard to the plans of the company, and the names of its officers have not been given except that of the Vice-President, Mr. L. White, of Buffalo.

Two new locomotives are to be purchased for the New York & Brooklyn Bridge Cable Railroad. These will be similar to the engines now in use, which are used at both terminals for switching the cars from the incoming to the outgoing track after they have been brought to the station by cable.

BRIDGE BUILDING.

Brampton, Ont.—Tenders are being received by D. Kirkwood, County Clerk, for the construction of a new bridge over the Credit River at Churchville.

Denver, Col.—The contract for building the new steel bridge over the Platte River at 38th street has been awarded to the Youngstown Bridge Works, of Youngstown, O., for \$16,000. The other bidders were: Detroit Bridge & Iron Works, \$19,000; Pittsburgh Bridge Co., \$21,500; Bullen Bridge Co., \$21,500; Wrought Iron Bridge Co., \$21,900; Colorado Iron Works, \$20,000; King Bridge Co., \$21,650; Milwaukee Bridge & Iron Works, \$21,175; Chicago Bridge & Iron Co., \$22,950; Missouri Valley Bridge & Iron Works, \$21,176; Farnsworth & Blodgett, \$22,000. The bridge is to have two spans of three Pratt trusses each, two 16-ft. ways, and two 8-ft. sidewalks, and to be built upon suitable tubular foundations with a clear length between the two end rows of cylinders of 200 ft.

Central Vermont.—This company has let a contract for replacing six spans of Howe bridges to the Rochester Bridge & Iron Works. The bridges are to be erected from plans by G. H. Thomson, Consulting Engineer.

Dansville, N. Y.—Receiver A. S. Murray, of New York City, is endeavoring to carry out various improvements on this road, but is hindered by lack of funds. He is especially anxious to replace the wooden bridge across the Canaseraga Creek near Dansville with an iron structure, to allow the trains of the Erie Railroad to run into Dansville. He has authority to issue \$1,000 of receiver's certificates, and has the promise of \$500 from the Dansville people. He has asked the Rochester Board of Trade to subscribe for the balance of \$500 needed to build the structure. This that body will probably agree to.

Hamilton, Ont.—Mr. A. McKay, M. P., has information from Ottawa that work on the substructure on the canal bridge will be commenced about Dec. 1. The cost of the substructure, irrespective of the bridge, will be \$5,000.

Natchitoches, La.—Sealed proposals will be received at the office of the Chancery Clerk, in Natchez, Miss., until February, for building a steel bridge over the Homochitto River, between Adams and Wilkinson counties, at Swazey's Ferry.

New Stanford, Ct.—The Philadelphia, Reading & New England Railroad is building a new iron bridge at this place. John F. O'Rourke, of New York City, representing the Boston Bridge Works, has the contract for the iron work.

Orting, Wash.—The County Commissioners opened bids for the combination iron and wooden bridge at Orting, as follows: Tacoma Bridge & Construction Co., seven spans, respectively \$2,600, \$2,575, \$2,700, \$2,724, \$2,810, \$2,840, and \$125 added for crib piers; Bullen Bridge Co., of Portland, \$3,889 and \$3,800; L. Van den Steen, \$3,399, \$3,235, \$3,148, \$2,990, with \$221 added for cribs. The contract has not yet been awarded.

Ottawa, Ont.—Plans are being prepared by the Public Works Department for a wooden bridge with iron trestle work across Pond Creek, for which the sum of \$5,000 was voted last session.

Philadelphia, Pa.—Ordinances have been introduced into Common Council providing for the construction of bridges over the Philadelphia, Wilmington & Baltimore at 71st street, and over the Philadelphia & West Chester at 58th street.

Peterboro, Ont.—A new steel bridge in three spans, averaging 110 ft. each, will be constructed over the Otonabee River, near this town.

Sorel, Que.—An iron bridge to cost \$250,000 will be built across the Richelieu River at this place. The Government will be asked to grant a bonus of \$50,000. The erection of a new station by the Montreal & Sorel Railroad may also be included in the undertaking.

Stillwater, Minn.—The Board of County Commissioners has awarded Gillett, Herzog & Co., of Minneapolis, the contract for building a steel wagon bridge over the Omaha tracks at Oak Park. The price is \$2,175.

Toledo, O.—Citizens of this city cannot reach a decision as to where the proposed bridge over the Maumee River shall be located, and for the construction of which \$200,000 of bonds have been authorized. They are to hold a public meeting to decide the matter. A movement is on foot to build a bridge over Swan Creek at Perry street.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Burlington & Quincy, \$1 per share, payable Dec. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic & Pacific, annual, Boston, Mass., Dec. 13.

New York Lake Erie & Western, annual, New York City, Nov. 27.

Lehigh & Hudson River, annual, New York City, Dec. 3.

New York, Pennsylvania & Ohio, annual, Cleveland, O., Dec. 5.

Wheeling & Lake Erie, special, Toledo, O., Dec. 22.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station, on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

American Society of Mechanical Engineers.

The annual meeting will be held at the society's house, No. 12 West Thirty-first street, New York City, Dec. 3 to 7. The opening session will be on Monday, Dec. 3, at 9 p. m. The discussion of the topical questions: Are there certain general principles underlying the proper connections of steam boilers and engines in a power plant?

What form of filing cabinet have you found most convenient for clippings, etc.? will be taken up.

There will be sessions thereafter, for the reading of papers, on Tuesday at 10 a. m., and at 8:30 p. m.; Wednesday, 10:30 a. m.; Thursday, at 10:30 a. m., and Friday at 10:30 a. m. On Wednesday evening there will be a reception at Sherry's for members and ladies accompanying them. The President's address will be read at this reception at 9 o'clock. The afternoons of Tuesday, Wednesday and Thursday are left without assignment, so that members may visit points of professional interest in or about the city, or spend the time as may be most agreeable to each. It is announced that the summer meeting of 1895 will be held at Detroit, Mich. The following is a list of the titles of papers to be read at this meeting:

Keep, W. J., Relative Tests of Cast Iron.

Sinclair, G. M., Notes on Steel Forgings.

Webber, Samuel and S. S., Trials of a Vertical Triple Expansion Condensing Pumping Engine at the Trenton Water Works.

Peabody-Miller, Tests on the Triple Expansion Engine at the Mass. Inst. Tech. (Second paper.)

Dean, F. W., Trial of a Leavitt Pumping Engine: Trials of a Recent Compound Engine with a Cylinder Ratio of 7:1; Changing the Suction System of a Pumping Engine.

Lanza, Gaetano, Tests of the Strength of Spruce Columns.

Kerr, C. V., on the Theory of the Moment of Inertia.

Porter, Charles T., Comparison of the Action of a Fixed Cut-off and Throttling Regulation, with that of the Automatic Variable Cut-off on Compound and Triple Expansion Engines.

Description of a Cam for Actuating the Valves of High Speed Steam Engines; Description of an Improved Steam Separator and an Improved Steam Jacket; Description of an Improved Centrifugal Governor and Valve.

Lanza, Gaetano, Stresses in the Rims and Rim Joints of Pulleys and Fly-wheels: the Application of Brakes to the Truck Wheels of a Locomotive.

Goss, W. F. M., An Experimental Study of the Effect of the Counterbalance in Locomotive Driving-wheels Upon the Pressure of Contact Between Wheel and Rail.

Field, C. J., Present and Prospective Development of Electric Tramways.

West, T. D., Relative and Special Tests of Cast Iron.

Wood, M. P., Rustless Coatings for Iron and Steel.

Bissell, G. W., The Effect of Clearance on Economy of a Small Steam Engine.

Jacobus, D. S., results of Experiments to Test the Accuracy of Small Throttling Calorimeters.

Barr, J. H., Experiments on a System of Governing by Compensation.

Platt, J. C., Straightening a Leaning Chimney, 100 feet high.

Robinson, A. W., Drawing Office Appliances.

Randolph, L. S., Strength of Railway Car Axles.

Henderson, G. R., A Graphical Method of Designing Springs.

Engineering Society of the Ohio State University.

The Engineering Society of the Ohio State University held a meeting November 21, and discussed the different forms of rail in street railway construction in use in Europe and the United States. Their next meeting occurs Dec. 4.

PERSONAL.

—Mr. John F. Flourney has been appointed Receiver of the Georgia Midland & Gulf Railroad in Georgia.

—Mr. H. Milton Kennedy, General Passenger Agent of the South Jersey Railroad, has tendered his resignation and will engage in the brokerage business in New York.

—Mr. Henry Eicks has been appointed Acting Freight Agent of the Wabash at Chicago, vice E. R. Newman, who has been promoted to be Assistant General Freight Agent.

—Mr. Frank Holland, recently appointed Master of Trains of the Southern Railway, has tendered his resignation quite unexpectedly to the management. His successor has not yet been appointed.

—Mr. E. R. Newman has been appointed Assistant General Freight Agent of the Wabash road at Chicago, vice Mr. Sumner Hopkins, resigned. Mr. Newman was Assistant General Freight Agent of the Wabash eastern lines during the receivership of Mr. McNulta and he has since served the reorganized Wabash Co. as local freight agent at Chicago.

—Mr. E. B. Ely, President of Coxe Brothers & Co., coal operators, died at Bayonne, N. J., on Nov. 23. He was for many years previous to his elevation to the office of President, General Agent in New York for the firm. He was also Vice-President of the Delaware, Susquehanna & Schuylkill Railroad Company. In Bayonne

he was a Director of the Mechanics' Trust Co., and was active in many local business and charitable enterprises.

—Mr. Elmore B. McNeil died last week in Chicago of an attack of typhoid fever. He was a graduate of the Rensselaer Polytechnic School, Troy, N. Y., and was for some time engaged in the construction of the West Shore Railroad. After this he was Superintendent of the Grand Island Division of the Union Pacific Railroad. At the time of his death he was conducting an enterprise to carry off the sewage of Chicago to some point west of the city.

—A number of the old officers of the Mexican Central Road have followed Mr. E. W. Jackson, lately Vice-President and General Manager, to the Interoceanic road, on which Mr. Jackson now occupies a similar position. Mr. E. V. Sedgwick, who was Master Mechanic on the Mexican Central, has become Superintendent of Motive Power and E. A. White, General Passenger Agent, recently resigned from the Mexican Central, becomes General Freight and Passenger Agent.

—Mr. Carleton B. Hutchins, President of the Hutchins Refrigerator Car Co., of Chicago, and C. B. Hutchins & Son, of Detroit, manufacturers of freight-car roofing, died at Detroit on Nov. 22, aged 80 years. Mr. Hutchins was born in Bath, N. H., in 1814. He came to Ann Arbor in 1868, and began experiments in car roofing and refrigerator cars. He obtained patents on both, and then came to Detroit and organized the car-roofing firm, and later the Detroit Refrigerator Car Co., which was subsequently moved to Chicago and is known as the Hutchins Refrigerator Co.

—Mr. William T. Thelin, General Auditor of the Baltimore & Ohio Railroad Company, died suddenly last week at his home, in Mt. Washington, near Baltimore. He had been at his office in Baltimore during the day, and left the building in apparent good health. His death was caused by apoplexy. Mr. Thelin was a well-known railroad accounting officer. His association with the Baltimore & Ohio Railroad covered a period of 22 years. In 1882 he was appointed Auditor of the road, and in 1884, when the accounting department was reorganized, he was made General Auditor.

—Mr. T. B. McKay, for many years Passenger Agent for the Chicago, Burlington & Quincy, at San Francisco, has resigned, and in December will sail for Japan as the General Passenger Agent for the Pacific Mail and the Oriental and Occidental Steamship companies, the Southern Pacific, the Union Pacific and the Chicago Northwestern companies for India, China and Japan. His headquarters will probably be in Yokohama. The companies for which he will be agent will act together in handling the passenger traffic from the East to America. The competition of the Canadian Pacific in this class of travel is the main reason for sending him to Yokohama.

ELECTIONS AND APPOINTMENTS

Annapolis & Baltimore Short Line.—Nov. 21 a meeting of stockholders was held at Annapolis. J. S. Ricker, George Burnham, Jr., W. W. Brown, J. H. Smith, of Portland, Me., F. E. Fennesen, of Boston, and C. A. Coombs, of Baltimore, were re-elected Directors. J. S. Ricker was re-elected President; L. A. Burk, Treasurer, and C. A. Coombs, General Manager.

Baltimore & Ohio.—The appointment of S. P. Kretzer as Land and Immigration Agent is announced. He succeeds M. V. Richards, who has gone with the Southern Railway.

Baltimore & Ohio Southwestern.—The annual meeting of the stockholders was held at Cincinnati, on Nov. 22. The election of Directors resulted in two changes. James A. Wilson and Julius Walsh were succeeded by James Sloan, Jr., and Augustus Ewing. The retiring members resigned because of other duties. The Directors elected officers as follows: President, E. R. Bacon; Vice-President and General Manager, W. W. Peabody; Vice-President and Traffic Manager, William Duncan; Treasurer, W. E. Jones.

Barre.—A. D. Morse, of Barre, Vt., has been elected Director and President of this corporation, vice A. F. Sortwell, of Cambridge, Mass., resigned.

Central Vermont.—The stockholders elected the following Directors at their annual meeting at St. Albans, Vt., Nov. 23: Edward C. Smith, of St. Albans; L. J. Sergeant, of Montreal; B. R. Smalley, of Burlington; John Bell, of Belleville, Ont.; Charles Percy, of Montreal; James R. Langdon, of Montpelier; B. P. Cheney, of Boston; F. S. Stranahan, of St. Albans; W. Seward Webb, of Shelburne, and Robert Coit of New London. One vacancy is left to be filled by the new board.

Mexican Central.—It is reported that Mr. E. V. Sedgwick, Master Mechanic of this road, will shortly resign to enter the service of the Interoceanic Railroad as Superintendent of the Motive Power Department. G. W. Jennings will assume the duties of Master Mechanic and the office of Assistant Superintendent of Motive Power will be abolished.

Montpelier & Wells River.—At a meeting of the Directors of the railroad, held at Montpelier last week, Alvin F. Sortwell was elected President to succeed his father, the late Daniel R. Sortwell, who died on Oct. 4.

New York, Lake Erie & Western.—Charles F. Case has been appointed General Agent of the freight department, with headquarters in New York.

New York, Philadelphia & Norfolk.—R. H. Nicholas, formerly Superintendent of the Canandaigua Division of the New York Central, has been appointed Superintendent of the New York, Philadelphia & Norfolk to succeed the late Mr. H. W. Dunne. His headquarters will be at Norfolk, Va.

Philadelphia & Lansdale.—The officers of this company recently incorporated in Pennsylvania, are as follows: President, Robert A. Welsh, 1,326 Chestnut street, Philadelphia; Vice-President, H. A. Mullen, Southeast Eighth and Walnut, Philadelphia; Secretary, C. D. Matlack, 708 North Eighth street, and Treasurer, A. H. Harley, 1,802 Ridge avenue, Philadelphia.

Randolph County.—Articles of incorporation have been filed with the Secretary of State in Illinois, to build a railroad from a point on a main line of the Centralia & Chester Railroad near Sparta, to a point near Percy Randolph County. The incorporators and directors are H. A. Schmidt, E. A. Burrill, B. F. Stillson, R. J. Goddard and D. P. Barker, all of Sparta, Ill.

Richmond, Frederickburg & Potowmack.—These officers were elected at the annual stockholders' meeting in Richmond, Va., Nov. 21: Major E. T. D. Myers, President; Directors, B. F. Newcomer, Moncure Robinson, H. Walters, W. J. Leake; J. Taylor Elyson was announced as State Director; Examining Committee, J. R. Baylor, M. Robinson, Charles Ellis, L. B. Anderson, Taylor Berry.

South Jersey.—Receiver McGowan has issued an order, to take effect Dec. 1, discontinuing the offices of General Manager, General Passenger Agent and Superintendent at Cape May, N. J., held respectively by James E. Taylor, H. Milton Kennedy and W. G. Christian. These several offices will be merged into one, managed by Mr. Henry B. Wood, to whom employees of the several departments are ordered to report.

Southern Pacific.—The following circular from the office of General Superintendent Fillmore concerning the operations of the different sections of the road, explains more fully than has been done heretofore, the changes in the division superintendencies. The lines between Lathrop, Stockton and Fresno, including the Raymond branch, are added to the Western Division, and will hereafter be operated by A. D. Wilder, Superintendent, with headquarters at Oakland pier. All lines between Mendota, Fresno and Los Angeles now embraced in the San Joaquin Division, including the Polkay branch, will hereafter be known as the San Joaquin Division. D. Burkhalter is appointed Superintendent of the San Joaquin Division, with headquarters at Bakersfield. James L. Frazier is appointed Superintendent of the Coast Division, vice W. H. Haydock, assigned to other duties. James Agler is appointed Superintendent of the Truckee Division vice J. H. White, assigned to other duties. H. Cooley, in addition to his duties as Resident Engineer, is appointed Superintendent of the Shasta Division, vice James Agler, transferred.

Wisconsin Central.—W. B. Courtwright has received the appointment of Eastern Agent of the railroad, with headquarters in New York.

RAILROAD CONSTRUCTION, INCORPORATIONS, SURVEYS, ETC.

Alder, Clarion & Western.—Judge John Porter, of Eldora, Ia., formerly President of the Chicago, Iowa & Dakota road, in Iowa, is organizing a new construction company to be known as the Alden, Clarion & Western, to build a railroad from Alden to Clarion and northwest to connect with some through line. This extension would probably connect the Chicago, Iowa & Dakota, that now makes a junction with the Chicago & Northwestern and runs from Eldora Junction to Alden.

Chicago & Northwestern.—This company now has a double track road all the way between Chicago and Milwaukee, having recently completed the second track on the line between Racine and Kenosha, Wis., 11 miles. The only single track portion of the division between Chicago and Milwaukee is at the railroad bridge at Racine, Wis. A new double track bridge will be erected at this point next season.

Chicago Central Elevated.—Charters were filed at Springfield, Ill., on the same day last week, for this company and the Union Elevated road, to build an elevated loop in Chicago in the business district to connect the elevated railroad. This company is thought to be intended for down-town loop for the Alley Elevated running south and the Metropolitan line running west parallel with Yerkes' Lake street line. The Chicago papers see in the organization of these two companies a contest between the consolidated Metropolitan and Alley roads on one side and Lake Street Elevated and Illinois Central on the other.

Cleveland, Cincinnati, Chicago & St. Louis.—President M. E. Ingalls denies the published report that the Directors of that road had determined to build an extension from North Vernon, Ind., to Louisville, thus paralleling the Baltimore & Ohio Southwestern. No such project is being considered by the Directors. Some time ago Mr. Ingalls said it was the intention to build to Jeffersonville if a favorable traffic contract could be made with the Baltimore & Ohio Southwestern, but the business depression put an end to the plan, if it was ever considered with the idea of building the additional mileage. The completion of the Louisville & Jeffersonville bridge will give the Big Four increased facilities for reaching Louisville and no doubt some readjustment with the Baltimore & Ohio Southwestern is being discussed to gain the advantage which the new bridge will offer.

Columbus, Hocking Valley & Athens.—The construction work begun by Chief Engineer W. H. Jennings a few days ago is only a temporary start. Last winter when the Legislature granted the company a charter with the privilege of using the Hocking Canal bank, it made a condition that work must begin on the road-bed within six months. Last Saturday the six months' time limit ended, and injunction proceedings are still pending against the company to prevent the building of the road down the canal. In order to prevent the charter from lapsing, teams were put at work on the road-bed and kept at work for two days. Now the company can claim that the construction of the road has been begun.

Ebensburg & Blacklick.—This newly-opened branch of the Pennsylvania from Ebensburg to Vintondale, 12½ miles, may be extended on 23 miles further to a connection with the West Penn road. This would considerably shorten the time between Cresson and Pittsburg. Preliminary lines have been run up the west branch of Black Lick Creek to near Kinnel and from there down Yellow Creek to Homer City. The country through which the branch now runs is very wild and its construction cost the Pennsylvania nearly \$20,000 a mile. At Twin Rocks there is a deep cut 900 ft. long that cost \$50,000 alone. Charles McFadden, of Philadelphia, was the contractor.

Findlay, Fort Wayne & Western.—The entrance of this road into Fort Wayne, Ind., is likely to be accomplished by Dec. 1. The grading has been finished into that city for some time and the track-laying has been going on rapidly and continuously for some weeks. The length of the new line is about 17 miles from the old terminus of the road in Ohio across the Indiana State line to Fort Wayne. The trains of the company will be run into the station of the Wabash in that city.

Fort Worth & Rio Grande.—It is reported at Fort Worth, Tex., that work will soon begin on an extension of this road from its present terminus at Brownwood, Tex., to some point on the Colorado River, a distance of 50 miles. The road at present is operated from Fort Worth to Brownwood in the Texas Panhandle, as part of the Union Pacific, Denver & Gulf, but with a separate receiver, Morgan Jones, of Fort Worth.

Georgetown & Granger.—A meeting of stockholders of the railroad was held last week and the contract with M. P. Kelley made in July was ratified and authority given the Directors for consolidating the road with the Trinity, Cameron & Western, another uncompleted road in Texas. The Directors were also authorized to arrange for an issue of bonds for building and equipping the road. The contract with Kelly & Co. requires that actual work of construction begin by Jan. 1 and trains to be running within one year from that date. The length of the line from Georgetown to Trinity is about 145 miles.

Little Rock & Pacific.—This company filed its charter in Arkansas last week. Gov. W. M. Fishback is President, D. G. Fones, Vice-President, George W. Clarke, Secretary, and S. R. Cockrell, Attorney, all of Little Rock. The total capital stock is \$4,600,000, of which \$230,000 has been subscribed. The length of the road, including branches, is to be 230 miles. The main line will pass through Pulaski, Perry, Yell, Logan and Sebastian counties, in Arkansas. Wister Junction, Indian Territory, will be its western terminus, where it will connect with the Choctaw, Oklahoma & Gulf road.

Megantic & Lotbiniere.—The formal ceremonies of the opening of this railroad took place at Ste. Philomene, six miles from St. Jean des Chaillons, Lotbiniere County, Que., last week, in accordance with the general custom in Quebec. The new road will establish a communication between Grand Trunk and the interior of the Lotbiniere County. C. Rinfret, M. P., E. H. Laliberte, M. P. P. for Lotbiniere, and a number of leading citizens were present. The new branch is about 40 miles long, starting from Lyster, Megantic County, and having its terminus at St. Jean des Chaillons on the river. It passes across a forest country offering advantages for colonization, and its construction is due to Mr. E. H. Laliberte, M. P. P. and his friends, who, in 1883, succeeded in obtaining from the Quebec Government the granting of a subsidy of \$90,000.

Meigs Elevated (Boston).—The officers will probably make application to the Board of Aldermen within a few weeks to approve the locations of the road as designated by the Legislature. If the Aldermen approve the locations the company will have until Feb. 1 to file its \$200,000 bond. Officials claim that some contracts have been given out, but decline to state their nature. When the Meigs bill passed the Legislature and the special election was held in Boston, and a favorable vote was secured, there was much activity in electing directors, officers, and in other matters of organization, which led to a general belief that the structure would long ago have been under way. Nothing of that nature has been done and the probability of any active work being done seems remote.

Montreal & Ottawa.—The Canadian Pacific has agreed to build the Montreal & Ottawa Rail way in Ontario, south of the Ottawa River, as far west as Alfred by next summer, continuing on until Ottawa is reached. Alfred is a few miles west of Caledonia Springs, the present terminus.

New Roads.—J. P. Nattington, J. S. Koslowsky, and G. W. Gibson, of St. Louis, and W. H. Brooker, of San Antonio, are interested in a project to construct a railroad connecting Brownsville, Tex., with the railroad systems of the State. The bonus of \$160,000 raised to secure the so-called Corpus Christi Railroad last year, will be available for this project.

New York, Ontario & Western.—The company has definitely located the Ellenville branch from Ellenville to Napanosh, N. Y., the site for the new Eastern State Reformatory. The new railroad will be built on the east side of the Delaware & Hudson Canal. It is expected that work will be commenced on about Jan. 1. Surveys have also been made down the Rondout Valley for a further extension to Alligerville and Creek Locks, the latter place being within 10 miles of Kingston.

Nippenose Valley.—At a meeting of citizens interested in the construction of a line in Nippenose Valley at Oval, Pa., Nov. 17, the report of the committee that passed over the proposed route from Williamsport to Jersey Shore, Pa., was adopted. S. C. Tate, J. V. Rumsey, Leonard Wright and J. H. Pearson, were appointed a committee to take charge of the work. A preliminary survey is to be made at once. The road will be about 20 miles in length.

Odell City, Hot Springs & Wind Cave.—This railroad company was incorporated in South Dakota last week to build a narrow gage railroad from Hot Springs. Abel W. Odell, Emmet B. Cook, Orpha J. Odell, Eveline Cook, Archie W. Riordan, are directors.

Ohio Southern.—A charter for the Columbus Branch of this railroad was recently filed in the office of the Secretary of State at Columbus, O. This branch leaves the present line at Jeffersonville in Fayette County, a town south of Springfield, and extends northwesterly to Columbus. The road has been graded east of Jeffersonville to the town of Midway, 10 miles, and right of way has been secured several miles east of the latter town. The right of way through to Columbus will probably be secured during the winter, and the construction work will be completed to the latter town next season. The track beyond Jeffersonville has been laid to within a few miles of Midway, but will not be continued east of that town this winter. The branch will connect at Columbus with the Cleveland, Akron & Columbus Road, which is controlled by the same interests operating the Ohio Southern Railroad. The building of this branch will complete a new route between Cincinnati and Columbus. In addition to the extension west of Jeffersonville, the Ohio Southern has built a branch west of that point to McKay's Station, 17 miles in the direction of Cincinnati. Arrangements for the further extension into Cincinnati have not yet been determined upon, but it is thought that the railroad will make a junction with the Little Miami Division of the Pennsylvania and enter Cincinnati over the tracks of that road. The present main line is from Lima to Wellston, O., 184 miles. The distance between Cincinnati and Columbus when these extensions have been finished is given as 108 miles by the Ohio Southern, 116 miles by the Baltimore & Ohio, 121 miles by the Pennsylvania, and 125 miles by the Big Four.

Ottawa, Arnprior & Parry Sound.—Mr. Chamberlain, General Manager, Mr. G. A. Mountain, Chief Engineer, and Mr. Fanquier, chief contractor of the railroad, recently left Ottawa on a survey of the proposed route of the railroad through to Georgian Bay, in order that during the coming winter preparations may be made for the completion of the line next summer.

Pennsylvania Midland.—The construction train is fast approaching the Blair County line. The road is now finished between Cessna and Osterburg, Pa., a distance of six miles, or about one-fourth of the entire route. Eleven carloads of rails have been distributed along the line and ten more cars are on the way.

Queen Anne.—Mr. J. W. Troxel, Chief Engineer of the proposed railroad, has been in Caroline County for some time, surveying and securing the right of way, and generally has secured the active assistance of the people.

Rice Lake, Dallas & Menominee.—This company is now operating a road from Rice Lake to Cameron, Wis., 7½ miles, and surveys have been made south of Cameron to Dallas, 124 miles. No contracts have been let for the extension yet, but the work will probably be pushed in the spring to a connection with the Wisconsin Central at Wheeler and to Menominee, Wis., on the Chicago, Milwaukee & St. Paul. M. P. Barry is General Manager.

Santa Fe, Prescott & Phoenix.—The track of

the southern extension beyond Prescott, Ariz., reached the Congress Mining Camp, on Nov. 9, 125 miles south of Ashfork, Ariz. The Congress is reputed to be the richest gold mine now in operation in the United States, and is controlled by the "Diamond Joe" estate. The terminus of the road is to be at Phoenix, 210 miles south of Ashfork, the northern terminus. The previous terminus of the operated road has been at Kirkland, Ariz.

Sugar Creek, Pack's Branch & Paint Creek.—A charter was issued to this company last Friday in West Virginia. The company has a paid up capital of \$200,000, and proposes to build a line of railroad to begin at the mouth of Sugar Creek, in Fayette County, W. Va., connecting with a branch of the Chesapeake & Ohio, and thence up Sugar Creek to Paint Creek, in Kanawha County, W. Va. The principal office will be at Fayetteville, W. Va., and the incorporators are E. Smith, of Alderson, W. Va.; W. Smith, of Hawk's Nest, W. Va.; F. W. Smith, of Mt. Hope, Fayette County, W. Va.; William Prince and James F. Prince, of Prince's Station, W. Va.

Terminal Railroad Association of St. Louis.—Herbert Taussig, Chief Engineer of the Terminal Association, has informed the Street Commissioner of St. Louis that he will at once make application for a permit to change the supports under the Twelfth street bridge to give room to extend the elevated railroad tracks from Eighth and Gratiot to the Union Station. Mr. Taussig has not given the details of the plan of the proposed extension, but this application would seem to indicate that the route for the extension west along Poplar street from the present elevated structure of the Merchants' Terminal, and had been decided upon. This additional elevated structure will give the Big Four and Chicago, Burlington & Quincy an entrance into the new Union Station.

Treskow, Beaver Meadow & New Boston.—This new line to connect the Coleraine collieries of A. S. Van Wickle & Co. with the Philadelphia & Reading, was completed Nov. 22, the first train passing over the road on that date. A. S. Van Wickle is President.

Union Elevated.—This is one of the two companies chartered in Chicago last week to build the long discussed elevated loop in Chicago to connect the Chicago Elevated railroads in the business part of the city. The capital stock is \$5,000,000. The proposed route gives the Lake Street Elevated a line through the business center, connecting with the Illinois Central suburban trains to the South.

GENERAL RAILROAD NEWS.

Amsterdam, Johnstown & Gloversville.—The New York Railroad Commissioners have denied the application of the projectors of this railroad asking for authority to build its proposed road. The road filed its application last August and there have been several hearings on the matter. It did not appear to the Board that public convenience and necessity required the construction of the road. In its memorandum filed with the decision, the Board says that the new road makes a saving of only two miles in the distance from Akin, near Amsterdam, north to Gloversville over the existing route of about 16 miles by the New York Central road to Fonda, and thence to Gloversville by the Cayadutta electric road. From Akin to Fonda the new road would practically parallel the New York Central and from Johnstown to Gloversville it follows practically a route already occupied by three existing railroads, the Cayadutta electric, the Fonda, Johnstown & Gloversville, and the Johnstown, Gloversville & Kingsboro horse road. In its memorandum the Board says: "In different reports this Board has set forth certain evils upon existing enterprises and upon the general community by the construction of unnecessary railroads. Such unnecessary railroads, after a brief period of unwholesome competition, speedily go into bankruptcy and finally become a burden upon older projects and upon the general community. The evidence is undisputed that the existing roads are abundantly able to transact all business now offered or that is likely to be offered for many years to come. If the charges made for transacting such business are exorbitant there is a better method of curing this evil than by inviting superfluous competition. Furthermore, if the existing roads between Fonda and Gloversville are making exorbitant charges, this fact may indicate that there is hardly business enough to support them upon reasonable charges, in which case there is obviously no occasion to build another road in a neighborhood already oversupplied."

Baltimore & Ohio Southwestern.—The report of the Board of Directors for the portion of the fiscal year commencing Nov. 1, 1893, and ending June 30, 1894, being the first annual report of the company, shows the total earnings, \$3,959,734; operating expenses, \$2,562,000; net earnings, \$1,397,670; total net income, \$1,405,392; decrease in expenses of \$435,260, and the net earnings decreased only \$34,135. The charges and taxes increased \$130,271. The earnings were sufficient to pay all the fixed charges and taxes for this period and leave \$16,746.

Central of Georgia.—A bill has been introduced in the Georgia Legislature the purpose of which is to prevent the reorganization of the road by the Southern Railway Co. It directs the Attorney-General to institute proceedings to forfeit the Central's charter if the road is controlled by the Southern Railway. The work of perfecting the details of the plan to reorganize the road has made considerable progress, but various interests have still to be harmonized. The name of the corporation will be changed to the Central of Georgia Railway Co., and the new organization will endeavor to secure new leases of the Southwestern and the Augusta & Savannah roads at a 5 per cent. rental.

Central Vermont.—The report to the stockholders gives the receipts for the year ending June 30 as \$5,245,053; operating expenses, \$3,658,993; net revenue, \$1,586,059. This amount, less the fixed charges, leaves a profit of \$5,513.

Chicago & Northern Pacific.—The bondholders' committee has had substantially all titles of land in Chicago transferred to the name of the company and the deeds recorded. It has investigated the company's accounts with Northern Pacific and found that \$2,500,000 Chicago & Northern Pacific bonds have been used by Northern Pacific for its own purposes, without authority and without compensation. Recourse must be had to the courts in the matter, unless a satisfactory settlement can otherwise be made. A foreclosure has been begun, but is delayed by officers of Chicago & Northern Pacific and Northern Pacific. The suit will be pushed as fast as possible.

Cincinnati, Hamilton & Dayton.—The company is continuing improvements to its roadbed, and during the past season has laid 10 miles of new rail on the Indianapolis division between Liberty and Brownsville, Ind., and a new iron bridge 450 ft. in length has been built over the Whitewater near Brownsville. Twenty-five thou-

sand new ties have been put in and a considerable amount of pile driving to protect banks against washing.

Cincinnati Southern.—United States Circuit Judge Lurton has made a decree at Knoxville, Tenn., requiring the payment within 90 days of \$450,000 of defaulted interest on the "Cincinnati extension gold mortgage" bonds in contest in the case of Toler and others against the East Tennessee, Virginia & Georgia Railway, the Central Trust Co., of New York, and others. In default of such payment the stock held in trust is to be sold in a block. This is regarded as an apparent victory for the Southern Railway Co., as against the Cincinnati, Hamilton & Dayton interests.

Denver Pacific.—Proceedings were begun in the United States Circuit Court at Denver, last week, by the bondholders of the Denver Pacific Railroad & Telegraph Co., to foreclose on the line. The suit is brought by George J. Gould and Russell Sage, as trustees. The defendants named are the Union Pacific Railroad and the Mercantile Trust Co., and the receivers of the Union Pacific. The property involved is the line between Denver and Cheyenne. The suit was begun originally in St. Paul. Default on interest due is the assigned cause of demand for foreclosure.

Georgia Midland & Gulf.—Judge Newman, of the United States Court, at Atlanta, Ga., granted a bill for injunction and appointment of a receiver for the railroad. The bill was filed by counsel, representing the Central Trust Co., of New York, the trustees for the bondholders on account of defaulted interest since July. John F. Flouney was appointed temporary receiver. December 3, is the date appointed for hearing the motion for a permanent receiver. The road is 98 miles long, and is bonded for \$15,000 a mile.

Indianapolis, Decatur & Springfield.—The stockholders are making arrangements to prevent the consummation of the contract which the first mortgage bondholders' committee has negotiated with the Lake Erie & Western Railroad, to turn the road over to that company. It is reported that they contemplate bringing a suit to that end.

Knoxville, Cumberland Gap & Louisville.—At Knoxville, Tenn., Nov. 21, the Supreme Court affirmed the ruling of the Chancellor who decided that the city of Knoxville must pay a subscription of \$225,000 to the road, on every point but one, and that was whether the road was able to issue bonds at that time, had the city been inclined to pay its subscription. This postpones the case for at least three years and is considered a victory for the city.

Lake Erie & Western.—A special meeting of the stockholders has been called to authorize an issue of first mortgage bonds at the rate of \$10,000 a mile, and of second mortgage bonds at the rate of \$5,000 a mile, upon the Indianapolis, Decatur & Springfield Railroad. A negotiation has been completed with the I. D. & S. first mortgage bondholders of that road by which the Lake Erie & Western can acquire the Indianapolis, Decatur & Springfield road in fee simple should the stockholders formally approve of the purchase. It is reported that some of the larger stockholders are averse to the proposition, to confirm which a two-thirds vote of the stock is required.

New York & New England.—The Receivers have filed in the United States Circuit Court at Boston a petition for leave to pay rentals on the leased lines of the company and interest coupons of the first mortgage bonds. The petition asks for leave to pay \$330,000 interest due on coupons of the first mortgage bonds of the company, also \$20,000 rent of the Rhode Island & Massachusetts. The petition also alleges that there has been an increase of the capital of the Norwich & Worcester Railroad since the lease was made, and that it is claimed that the New England is bound to pay the dividends on the increase and also the taxes due.

Philadelphia & Reading.—The Olcott-Earle Committee, through its counsel, announces definitely that the committee has determined upon foreclosure on Jan. 1, in case the junior securities do not accept the plan. The announcement has been received by opposing interests with a statement challenging the committee to go ahead with foreclosure. It will be impossible to foreclose within 15 years, they claim, the mortgage being so drawn as to make foreclosure practically impossible under existing conditions.

Seattle, Lake Shore & Eastern.—The bondholders are moving for a foreclosure, but obstacles are interposed by one interest after another. The Northern Pacific Road claims about \$3,000,000 which it alleges to have advanced for the benefit of the property and which must be recognized in any foreclosure sale, but which so far it is proposed not to recognize. The earnings are showing an increase over last year of about 25 per cent., but are still about 30 per cent. below those of 1892. The bonds are selling at about 46. Three coupons are in default and the road is not earning full interest on them.

York & Southern.—A mortgage for \$150,000 was filed for record at York, Pa., last week. The mortgage was given to the Security Title & Trust Co., of Philadelphia, to cover an issue of \$150,000 worth of five per cent. gold bonds. This road is the Pennsylvania portion of the Baltimore & Lehigh, the Maryland section of which is still operated by the Receiver.

TRAFFIC

Traffic Notes.

The decision of the United States District Court at Omaha restraining the officers of that State from enforcing the freight rate law passed this year, will be appealed.

The Sunday trips of the Fall River Line steamers between New York and Boston have been discontinued for the winter season, the final trip having been made on Nov. 25. The week day service continues without interruption.

The report of the California State Board of Horticulture, just out, says that the fruit growers of that State shipped last season about \$1,000,000 worth less of fruit than they would have sent had it not been for the railroad strike.

A merchant of Fresno, Cal., has put on mule teams to draw freight by wagons from there to San Francisco, 212 miles. It is said that dried fruit can be carried in this way cheaper than by rail over the Southern Pacific at present rates.

The merchants of Charleston, S. C., have induced the City Council of that City to appropriate \$8,000 for the establishment of a freight bureau. As recently noted in these columns, merchants in that city pay a special tax into the City Treasury.

Chicago is not the only place where the fashion of withdrawing from traffic associations now prevails. Southern papers report the withdrawals of one company after another from the Southern Passenger Association. As these notices take effect only at the end of six months after they

are given, the anxious reader will be warranted in remaining calm for a time.

The winter time-table of the Pennsylvania shows six additional suburban trains between Pittsburg and Wall, Pa. It will be remembered that the business in this locality fell off largely some time ago, passengers going to the cheaper street cars. Now it is said that some of the regular travelers have abandoned the street cars, chiefly on account of the discomforts of cold weather.

A tourist sleeping car will soon be put on between Boston and Los Angeles to be run once a week each way. The first trip will be made Dec. 5, and the route is over the Boston & Maine, the Central Vermont, the Rome, Watertown & Ogdensburg, the Grand Trunk, the Chicago & Grand Trunk, the Chicago, Burlington & Quincy, the Denver & Rio Grande and the Southern Pacific. Through sleeping cars have been put on between St. Louis, Mo., and Jacksonville, Fla. They run twice daily over the Louisville & Nashville, the Nashville, Chattanooga & St. Louis, the Western & Atlantic, the Central of Georgia, the Georgia Southern & Florida and the Savannah, Florida & Western.

The railroads taking shingles from Oregon, Washington and British Columbia eastward, have notified shippers that they will not hereafter change destinations except where such action is made necessary by insolvency of the consignee or similar strong reason, and when a change is made the applicant must give his bond to protect the road. It appears that the practice of changing has grown to considerable proportions, the reason, like that in the grain business further east, being the pressing demands of shippers who wish to send cars long distances before they have closed the sale of the goods. As the shingle business is being forced in every way possible, it comes about that when a shipment reaches its eastern destination the freight bill constitutes a very large share of its total value.

Now it is the express companies instead of the railroads at which certain merchants are incensed on account of the carload rate discrimination. It is true that the express companies seldom take a carload of freight for one consignee, and carload rates are not a familiar thing in express tariffs, but the elements necessary for a disturbance are there, all the same, and in this case they are found in the tariff on oysters from the Atlantic seaboard to the West, which has lately been raised from \$1.50 per 100 lbs. to \$2.50, on packages of less than 500 lbs., the old rate being left undisturbed on shipments exceeding that weight. These rates are to points west of Ohio. This change favors the western jobbers, of course, and New York dealers who sell to small western buyers say that they expect to be driven out of business.

Chicago Traffic Matters.

CHICAGO, Nov. 26, 1894.

The meeting of representatives of trans-continental roads convened here this morning with full representation of all the lines. Two propositions are likely to be advanced, as regards the passenger traffic. One contemplates the formation of an association similar to the old trans-continental association, having jurisdiction west of the Missouri River, the other the extension of the present tottering Western Passenger Association so as to cover all passenger traffic west of the Mississippi River to the Pacific Coast under a new and simple agreement. The latter plan is more likely to be adopted, provided the co-operation of the Canadian Pacific can be had. In fact, the Atchison flatly refuses to consider any plan which does not include all the territory in one association. Attention will probably also be given to freight questions. No one seems to know, however, what the position of the Canadian Pacific and the Great Northern will be. The position taken by the latter will depend upon that of the former. The other lines are depending upon the Southern Pacific to bring the Canadian Pacific into line, the general impression being that it can do so if it wants to.

There is no improvement in the passenger rate situation either east or west of here. The situation is admitted to be the worst ever known. Eastern lines have again agreed to abolish commission payments on eastbound business on Jan. 1 and a meeting is to be held next month to consider the adoption of a similar resolution as regards westbound business. These lines have passed similar resolutions so many times that little credence is now given to their statements that this time they "mean business." Passenger rates west of Chicago depend upon the outcome of the meeting being held this week.

The General Passenger Agents of the Western roads have recommended to the executive officers in charge of the 1895 pass agreement the issuance of passes to land and immigration agents under close restrictions and supervision. They also recommend the issuance of transportation bona fide newspaper men on proper advertising contracts.

The rules regarding the issuance of half-fare permits to clergymen have been materially modified for the ensuing year. Hereafter members will be allowed to issue certificates on their own motion only to ministers actively engaged in work on the line of road issuing the permit. All other applications are to be referred to the Chairman of the Western Passenger Association for approval.

Western roads have gradually extended the operation of their division-of-tonnage agreement until now it includes all territory westbound except Des Moines and all eastbound except Omaha. The Chicago & Northwestern objects to the inclusion of Omaha in the eastbound agreement on account of its traffic contract with the Union Pacific. So far the arrangement is working very well and it may possibly continue until Congress affords the roads some relief. There is a much better feeling among the Western roads regarding freight traffic than existed some time since. All the roads are inclined to get together and smooth over difficulties which arise, instead of allowing their traffic departments to meet actual or alleged cuts without any attempt to compromise.

The advances in excess baggage rates put into effect by the Western lines on Nov. 1 were short lived. The merchants and traveling men made such a protest against them that the roads made haste to repudiate the agreement. The trouble was that they put the rates up too high. A moderate advance might have stood.

With the close of navigation the St. Paul-Chicago lines will advance the flour rate from Minneapolis to New York to a basis of 35 cents per 100 lbs., an advance of 7½ cents. It is announced that the Soo Line will maintain this advance. If it fails to do so, the St. Paul-Chicago roads will meet via Chicago and the Grand Trunk and Wabash lines any reduction that may be made by the Soo.

The suit of the cattle shippers against the Atchison, Topeka & Santa Fé to test the legality of the switching charge of \$2 on each car switched by the road into the Union Stock Yards, was decided in favor of the shippers by Judge Grosscup to-day. Judge Grosscup held that the company agreed to deliver its cars at the depot; that the Stock Yards must be considered the depot for live stock, and that the original freight charges included all expenses to destination.